



APHIS Evaluation of the Foot-and-Mouth Disease Status of Namibia (Site Visit Report and Risk Analysis)

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Regionalization Evaluation Services
April 2005

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LIST OF ABBREVIATIONS

- **AHT:** Animal health technician
- **APHIS:** Animal and Plant Health Inspection Service
- **ASF:** African swine fever
- **BSE:** Bovine spongiform encephalopathy
- **CAHT:** Chief animal health technician
- **CAHW:** Community animal health worker
- **CBPP:** Contagious bovine pleuropneumonia
- **CEAH:** Centers for Epidemiology and Animal Health
- **CFR:** United States' *Code of Federal Regulations*
- **CSF:** Classical swine fever
- **CVL:** Central Veterinary Laboratory
- **DVS:** Directorate of Veterinary Services
- **ELISA:** Enzyme-linked immunosorbent assay
- **END:** Exotic Newcastle disease
- **EU:** European Union
- **FAN Meat:** Farm Assured Namibian Meat
- **FMD:** Foot-and-mouth disease
- **FMDV:** Foot-and-mouth disease virus
- **HACCP:** Hazard analysis and critical control point
- **IBR:** Infectious bovine rhinotracheitis
- **OIE:** World Organisation for Animal Health (formerly Office International des Epizooties)
- **PRRS:** Porcine reproductive and respiratory syndrome
- **RSA:** Republic of South Africa

- **SAT:** South African type
- **UK:** United Kingdom
- **U.S.:** United States
- **VCF:** Veterinary cordon fence
- **VHI:** Veterinary health inspector
- **VS:** Veterinary Services, Animal and Plant Health Inspection Service

EXECUTIVE SUMMARY

Namibia has officially requested that the Animal and Plant Health Inspection Service (APHIS) allow the importation into the United States of beef, lamb, and ruminant game meat from the region in Namibia south of the veterinary cordon fence (VCF). Given the history of the disease in this region of Namibia and the fact that there were no reports of foot-and-mouth disease (FMD) in the region since 1965, APHIS conducted a risk analysis to recognize the proposed region in Namibia as FMD free.

BACKGROUND

APHIS conducted a site visit in June 2003 to gather data and relevant information to assess the risk of importing FMD-infected commodities from a region in Namibia. The scope of the 2003 site visit included verification of FMD outbreak controls, an overview of the surveillance program and laboratory capabilities, vaccination practices and eradication activities, and movement and border controls. Particular focus was placed on movement control measures and the separation of the proposed free region from the region north of the VCF. In addition, APHIS considered the regional FMD situation in southern Africa and the risk of reintroducing FMD into Namibia from neighboring countries. APHIS used the data obtained during the site visit as well as information provided by Namibia to conduct this risk analysis.

OBJECTIVE

The objective of this risk analysis is to evaluate the likelihood of introducing FMD virus (FMDV) into the United States through the importation of FMD-susceptible species and products. This analysis will be used as a decisionmaking tool in determining the likelihood of the presence or introduction of FMDV into the designated FMD-free region of Namibia.

SUMMARY OF RESULTS

Hazard Identification

APHIS considered the presence of FMDV in ruminants and ruminant products from Namibia as a potential hazard.

Release Assessment

To conduct its evaluation, APHIS considered the 11 risk factors outlined in Title 9, *Code of Federal Regulations* (9 CFR), section 92.2.

Exposure assessment

Exposure assessment is the evaluation of the biological pathways leading to exposure of susceptible species to FMDV. In the past, APHIS conducted an assessment of the potential pathways of exposure to FMD-infected beef (CEAH 1995 and 2001). APHIS considers that the most likely pathway of exposure of susceptible species to potentially FMD-infected beef would be through feeding food waste to swine (CEAH 2001). Waste-feeder operations in the United States are licensed and inspected regularly by U.S. Department of Agriculture inspectors. The licensing process requires that producers cook the waste fed to swine, reducing the probability of survival of foreign animal disease agents in the waste. In addition, the number of waste-feeding operations declined dramatically since 1994, and several States have prohibited feeding food wastes to swine.

Consequence assessment

The consequences of FMD introduction into the United States would be extremely high. Available data do not allow quantification of the number of herds/farms that would be infected if FMD were introduced. Nevertheless, the cost of control, eradication, and compensation, if disease were introduced, is likely to be significant. In addition to the direct costs of FMD introduction, domestic and international trade losses would be very significant.

Using the difference in the Consumer Price Index in 2001, APHIS updated the results of a 1976 study by McCauley, et al., that estimated the direct costs (control and eradication program costs) and consumer impacts of FMD introduction over a 15-year period (1976-1990). The result is that the sum of the consumer impacts and direct costs in March 2001 dollars would be:

- \$35.8 billion for endemic FMD with voluntary control.
- \$34.4 billion for eradication by strict slaughter and quarantine.
- \$38 billion for eradication by area vaccination.
- \$40.5 billion for compulsory vaccination program with endemic FMD.

In addition to the direct costs of FMD introduction, domestic and international trade losses need to be considered. The value of U.S. exports of beef products alone, which would be immediately lost, was over \$3 billion in 2001 (WTA 2001). The sum of the consumer impacts, direct costs, and trade losses, would be between \$37 billion to \$44 billion, in 2001 dollars. This is an extremely high consequence.

RISK ESTIMATION

Risk estimation consists of integrating the results from the release assessment, exposure assessment, and consequence assessment to produce overall measures of risk associated with the hazards identified at the outset. Thus, risk estimation considers the whole risk pathway from hazards identified to the unwanted event (OIE 2002c).

The release assessment found that the likelihood of FMD being present in the region in Namibia south of the VCF to be low.

APHIS concluded that the likelihood of exposure of FMD-susceptible species to FMDV imported from Namibia to be very low. In a 1995 study (CEAH 1995), APHIS determined that a very small percentage (0.023 percent) of plate and manufacturing waste is not adequately processed prior to feeding to swine.

The consequences of an FMD outbreak in the United States would be extremely high. However, given the findings of the release and exposure assessments, APHIS believes the likelihood of introducing and establishing FMD from Namibia is low.

Introduction:

Primary Disease of concern: Foot-and-mouth disease (FMD).

Country or region(s): Namibia – The region of Namibia under evaluation consists of the area south of the veterinary cordon fence (VCF)¹, which the World Organisation for Animal Health (OIE) has recognized as FMD free since 1997.

Commodity: Namibia expressed interest in exporting beef, lamb, and ruminant game meat.

Potential pathway(s) of introduction: Legal exports of live ruminants and ruminant meat constitute the primary pathways considered.

Objective of the Evaluation:

This evaluation was conducted in response to Namibia's request to export beef, lamb, and ruminant game meat to the United States from the region south of the VCF that is considered by Namibia as FMD free. This review was conducted to evaluate the FMD-free status for the described region by considering the 11 factors identified in Title 9, *Code of Federal Regulations* (9 CFR), section 92.2.

Region under Consideration:

Namibia contains four zones (infected, buffer, surveillance, and free) for the purposes of FMD control (Appendix 1). The region consisting of the surveillance and free zones is under consideration by the Animal and Plant Health Inspection Service (APHIS) for FMD freedom.

- The infected zone is located north of the VCF and consists of the eastern and western Caprivi. The infected zone is so named due to the presence of free-roaming wild buffalo and the occurrence of FMD outbreaks. FMD vaccinations are conducted in this zone.
- The buffer zone is located north of the VCF. FMD vaccinations are conducted in certain areas of this zone. This area has a proximity to high-risk areas in neighboring countries, and contagious bovine pleuropneumonia (CBPP) is present. In addition, the control of the infrastructure, animal identification, and movement of animals is not as stringent as in the free area.
- The surveillance zone is an area that borders the VCF and is located in the FMD-free area. This area is at least two farms in width. FMD vaccination does not occur in this zone, which allows for the surveillance of FMD.
- The free zone comprises the commercial farming area south of the surveillance zone but also includes communal areas.

Background:

In February 2001, Namibia submitted a request to APHIS to evaluate a region of the country that the Namibian Government and the OIE classified as free of FMD. This is the region of Namibia that is south of the VCF comprised of the commercial farming area south of the surveillance zone and communal farms within the area. FMD has not occurred in the region since 1965. Initially, Namibia was interested in exporting beef and lamb to the United States from that region. However, Namibia is interested in exporting game meat as well.

¹ The VCF consists of a 17- to 21-wire gameproof fence of 2.4 meters (approximately 8 feet) in height on the north side, a dead space of 10 meters (approximately 32 feet), and an 8-wire stockproof fence of 1.4 meters (approximately 4.5 feet) in height on the south side.

APHIS conducted a site visit in June 2003 to verify and complement the information that the Government of Namibia submitted to support its request to be regionalized for FMD. The team consisted of six members that split into two groups. Each group visited different locations.

One group visited locations in the buffer region north of the VCF chosen to demonstrate local controls at the domestic border with the free region, local and regional measures applied to conduct FMD vaccination campaigns and surveillance activities, areas bordering Angola where common grazing practices are prevalent, and an area in Namibia where specialized technical animal health programs are conducted due to communal herd management practices, therefore presenting a different epidemiological picture from the remaining regions. In addition, this group visited a quarantine facility north of the VCF and a representative control gate on the VCF to evaluate movement controls of animals and animal products through the fence. This region was selected as the primary area along the internal border between free and affected regions. VS chose to review these high-risk regions based on the assumption that it might be able to identify high-risk factors for export in these regions. Because of the size of the region under consideration, high-risk areas were defined as (1) locations within the country near boundaries between buffer regions and regions considered free; (2) areas in Namibia where communal farming and herd management practices are common; and (3) locations near international borders that might pose an FMD risk.

The other group visited the official diagnostic laboratory and the Hosea Kutako international airport in Windhoek; the Meat Corporation of Namibia (Meatco) beef export abattoir in Windhoek and the Farmers Meat Market sheep/game abattoir in Mariental to evaluate processing procedures; the Buitepos entry point to observe international border fences with Botswana; a cattle and a sheep/game farm to evaluate herd management practices; and the quarantine and cold storage facilities at the main seaport in Walvis Bay.

Namibia has stated that the estimated amount of beef to be exported to the United States is 10,000 tonnes; and the estimated amount of sheep and goat meat is 7,000 to 10,000 tonnes.

HAZARD IDENTIFICATION

Hazard identification is defined by the OIE as, “The process of identifying the pathogenic agents which could potentially be introduced in the commodity considered for importation” (OIE 2003c). In this situation, the hazard is FMD virus (FMDV) that might contaminate susceptible animals or animal products exported from Namibia to the United States.

This document analyzes the FMD (and rinderpest) risk to the United States of importing animals and animal products from a region in Namibia south of the VCF (the surveillance and free zones) if APHIS were to consider the region as free from FMD. The document will be used as a decisionmaking tool to evaluate whether APHIS should remove FMD restrictions on susceptible species and products. Epidemiological characteristics of the agent relevant to the import risk it might pose are described in Appendix 6. As to rinderpest, Namibia has not had an outbreak since 1907. Because rinderpest has not been diagnosed in Namibia since 1907, we are proposing to recognize Namibia as free from rinderpest.

Release Assessment

To conduct its evaluation, APHIS considered the 11 risk factors outlined in 9 CFR, section 92.2. The observations made by the site visit team and the information submitted by Namibian officials for each of these factors are discussed in this analysis.

Main Findings

Authority, Organization, and Infrastructure [1-11]

General information

Veterinary control and infrastructure in Namibia are highly dependent on close interaction between the headquarters in Windhoek and the State veterinary offices at the district level. The competent authority for animal health programs is the Directorate of Veterinary Services (DVS), which is administratively within the Ministry of Agriculture, Water and Rural Development.

Regulatory authority

Authority for DVS was granted by the Animal Disease and Parasites Act, No. 13, of 1956. This Act is also the main legislation for animal health. All OIE List A diseases are notifiable under this Act. In addition, this Act authorizes disease control measures as well as animal movement controls. Additional Acts that provide authority to the DVS are the Undesirable Residue in Meat Act, the Stock Brands Act [6], and the Government Notice on the Prohibition of Certain Farm Feeds. These Acts give authority for control of harmful residues in meat, mandate animal identification, and prohibit feeding of animal protein products, respectively.

DVS headquarters officials in Windhoek develop all policies, laws, and regulations relating to animal health issues. Functions of DVS include:

- Coordination and supervision of the overall animal health program (including farm visits);
- Development of disease control strategies;
- Regulation and control of international commerce in animals and animal products;
- Registration and control of vaccines;
- Laboratory diagnosis;
- Auditing of State veterinary offices;
- Inspection of animals and animal products being imported; and
- Training of government and nongovernment officials involved in animal health issues

Programs managed by DVS include: FMD control and eradication, control of CBPP, rabies control, bovine spongiform encephalopathy (BSE) surveillance, biological residue control, and traceability. FMD, CBPP, rabies, and exotic Newcastle disease are the highest priority diseases in Namibia [2].

Namibia has a nationwide computerized system for the collection of animal disease data and related farming issues (grazing, animal condition, vaccinations, treatment), which was established in 1985. The database contains data from 1986 to the present. Most of the collected data are geo-referenced, which allows for mapping. All collected data are sent to the central epidemiology unit for processing and report generation. The epidemiology unit collects relevant data on the animal health status from all regions of the country. In addition, it collates, manages, analyzes, and reports on data collected to accurately reflect Namibia's animal health status, surveillance, and disease control activities. Reports and information are provided to stakeholders. These include the National Summary Report, Disease Listing, Animal Health Inspection Update, Epidemiology Update, and the Annual Report. The unit also reports to the OIE on a monthly basis.

Organizational structure

The Director of DVS reports directly to the Deputy Minister of Agriculture. The Director is assisted by four deputies who have both functional and geographic responsibilities as follows:

- a) The Deputy Director for Cattle Areas is primarily responsible for cattle disease control north (buffer and affected zones) and south (surveillance and free zones) of the VCF;
- b) The Deputy Director for Sheep Areas and Meat Hygiene shares responsibility with the Deputy Director for Cattle Areas for State veterinary offices and is responsible for small ruminant disease and inspections in the abattoirs;
- c) The Deputy Director for Epidemiology and Extension Services is responsible for information systems and epidemiology; and
- d) The Deputy Director for Diagnostic Services supervises the central and regional diagnostic laboratories.

The country is subdivided into 15 State veterinary districts, each covered by one to three veterinarians. (See Appendix 2 for a map of the districts.) Veterinary programs are implemented by State veterinary offices (i.e., DVS field offices with authority over a veterinary district that report directly to the central office in Windhoek). The State veterinary offices are staffed by a State veterinarian, a chief animal health technician (CAHT), a number of animal health technicians (AHT), and other administrative personnel—all of whom are DVS employees.

Official approval was pending in 2003 for a new personnel system that would increase the number of AHTs to 20 per district because the current number of AHTs is too low to cover large areas.

Despite this, mechanisms are in place for expanding the governmental workforce. In the communal areas, there are community animal health workers (CAHWs) who assist DVS personnel in disease surveillance activities. CAHWs are not government employees, though they are trained in a government program. However, they are members of the community that they serve. The goal of the CAHW program is to spread veterinary services throughout the communal farming areas and establish a more comprehensive and accurate animal disease treatment, surveillance, and reporting system. CAHWs benefit themselves and government programs by selling medications and providing animal health related services to their respective communities.

A personnel issue of significant concern was identified during the site visit. It was learned that several senior DVS officials are scheduled for mandatory or voluntary retirement in the upcoming year with no apparent plans for overlapping by replacements. Highly trained personnel are spread very thin over a large range of duties, and qualified recruits are apparently either unfunded or recruits are difficult to identify. In addition, several senior DVS officials are scheduled for mandatory or voluntary retirement in the upcoming year with no apparent plans for overlapping by replacements. This creates the concern for loss of institutional memory and failure of the current disease control systems.

The lack of an FMD outbreak in the surveillance and FMD-free zones despite the fact that these areas are adjacent to regions considered to be FMD affected indicates constant and conscientious disease surveillance by the leaders of the DVS organization. Continuation and improvement of the current animal disease surveillance and control measures are essential to an ongoing freedom of disease. Unfortunately,

this may not be possible if the institutional memory developed through the last 20 years is lost due to the retirement of the senior veterinary officials.

In response to the site team's concerns, DVS stated that it is very conscious of the loss of institutional memory due to the retirement of senior staff and it will try to address the situation. The ongoing restructuring of DVS should address the workforce requirements for effective FMD surveillance. Also, appropriate field personnel are being transferred to headquarters in Windhoek to become familiar in relevant fields. APHIS will maintain contact with Namibian officials and, if concerns arise, revisit the region under the authority of 9 CFR, section 92.2. Section 92.2 allows APHIS to request, from regions that have been granted status under the regulations, information to confirm the region's animal health status.

State veterinarians are responsible for executing animal health programs, laws, and policies at the State level, taking into account the local circumstances applicable to their regions. Animal health programs administered by State veterinary offices include:

- Registration of properties;
- Collection and tracking of census data;
- Execution of vaccination programs and control of vaccine distribution;
- Animal and animal product movement control;
- Reporting and investigating suspicious cases, monitoring and eradication of outbreaks, surveillance activities;
- Monitoring of local animal gathering events (e.g., fairs, exhibitions, auctions); and
- Clinical investigations and sampling and local training.

Cooperation among central, State, and private sectors

Cooperation between DVS State and DVS headquarters officials is close, and information is shared regularly. Monthly epidemiological reports are prepared by State and central offices and are shared among all offices and the private sector. DVS headquarters officials hold annual meetings of staff veterinarians to keep them informed of relevant programs, policies, and training updates. In the communal farming areas north of the VCF (the buffer zone), staff meetings are held on a semiannual basis due to the higher potential for animal disease problems.

In addition, DVS participates with police at VCF gateposts leading into the proposed free zone to stop and inspect all vehicles in transit. Additional roadblocks are authorized in cases of emergency with apparent good cooperation of police and military personnel.

Central and State functions are supported strongly by farming and producer groups and local communities [3, 8]. DVS maintains direct and regular communication and information exchange with two umbrella organizations in the farming sector; namely, the National Agricultural Union, composed mainly of commercial farmers, and the Namibia National Farmers' Union, composed mainly of communal farmers.

DVS also consults with the Namibian Meat Board (an industry group with a focus on developing and improving livestock product markets). The Namibian Meat Board is considered the custodian of the beef industry and has the responsibility for allocating export and slaughter quotas to farmers. In fact, Namibian officials consider this interaction to be a significant factor in the control of FMD. For example, the Meat Board actively administers the Farm Assured Namibian Meat Scheme [7] and operates the Brand Registry. Every meat producer must register his or her brand mark with the Meat Board.

A discrepancy was identified in separate discussions with members of the Meat Board of Namibia and DVS officials. Members of the Meat Board indicated that their organization was directing disease control programs, as well as training of DVS personnel. However, DVS stated that the Meat Board is not involved in directing any of the animal disease control programs. DVS added that the only training that the Meat Board provides to veterinary officials is related to the quality assurance scheme (Farm Assured Namibian Meat (FAN Meat) Scheme²).

Quality control measures

DVS has finalized a formal system of auditing State veterinary offices to review their performance on important issues that could affect trade. During the audit, activities such as traceability, residue monitoring, BSE surveillance, monitoring farm feeds for ruminant protein, and livestock inspections will be reviewed. DVS will also audit obligations incurred by FAN Meat. The results of the audits are reflected in evaluation appraisals and salary increments to supervisors.

The site team visited State veterinary offices in the districts of Grootfontein, Ondangwa, Otavi, Omaruru, and Walvis Bay. Site team members received overviews of the activities and structures of the offices and reviewed premises registration, census information, vaccination records (in vaccination areas), movement control documents, and visited farms to observe farming practices [8]. Observations on structure, effectiveness, and organization of the State offices in the different regions were consistent and indicated that the functions were performed effectively.

Education and training of veterinarians and technicians

The Veterinary Association of Namibia is the official veterinary professional organization in Namibia. Most government and private veterinarians are members of the association.

Every veterinarian who wishes to practice veterinary medicine must register with the Namibian Veterinary Council. The Council sets veterinary standards for the entire country and consists of representatives from the States and the Veterinary Association [2].

Foreign veterinary graduates from universities other than those located in the Republic of South Africa (RSA) and Zimbabwe are required to pass a national exam before they can practice in Namibia. Namibian officials cited several examples in which the government provided additional training (2 or more years) in the RSA and Zimbabwe to foreign graduates to raise their knowledge and skill levels [8] when their exam grades were not acceptable.

The nonveterinary field inspection staff for each State consists of a CAHT and two or more AHTs. These individuals are required to have 12 years of basic education plus a 3-year college degree; however, at the time of the site visit, the requirement for a 3-year degree had not been fully implemented nationwide.

DVS animal health officials participate in training activities on a regular basis. Included in these activities may be sessions conducted by veterinarians, AHTs, and community members directed toward producing an educated public that would be able to recognize clinical signs of disease and deal with

² FAN Meat is a consumer-oriented total meat quality assurance program that monitors and certifies meat for the export market to ensure adherence to European standards regarding biosafety, food safety, animal welfare, and meat quality and makes adequate provision for traceability of the product from the package to the farm of origin.

animal health issues. Moreover, there is strong commitment by the local communities and the private sector for support of general animal health activities, FMD eradication, and traceability (identification system), that is demonstrated by involvement in program activities such as vaccination, enforcement of vaccination policies, participation in education opportunities and outreach programs, and community meetings.

CAHWs complete a course to be trained on the basics of animal husbandry, animal handling, animal diseases, and essential animal health maintenance. The training is oriented toward preparing the trainee to establish a private business that provides very basic services and a limited veterinary pharmacy. CAHWs are not certified.

Garbage control/swill feeding

Act 13 of 1956 prohibits the feeding of domestic pigs with swill from foreign vessels. The prohibition is actively enforced. For example, Port Health, which falls under the Ministry of Health and Social Services, has authority over regulating international garbage from ships. At the international port in Walvis Bay, food and other waste from vessels are collected and disposed of by a company with which the government has a contract. The company dumps the refuse at the municipal dump at which veterinary officials and Ministry of Health officials perform spot checks. The refuse is covered with soil under supervision of municipal officials, and removal of the material from the dump is not allowed.

In addition, at the international airport in Windhoek, waste is burned or dumped in a general dump at the airport complex. Private contractors are responsible for disposing of waste from planes, buses, and trains in Windhoek.

Conclusion: DVS appears to have adequate authority and infrastructure to identify, control, and respond to foreign animal diseases. The organization is clear with a definite hierarchy of responsibility, checks and balances to ensure performance of duty, and well defined protocols for most situations. Within Namibia, sharing of information and data flow among DVS personnel (headquarters and State) and private sectors is evident.

Great emphasis is placed by DVS personnel on education and participation of livestock producers in disease control, and the support by individual producers appeared to be substantial. Education of veterinary officials appears to be adequate for veterinarians and AHTs, although a number of positions for qualified individuals remain open. Duties for these positions are currently provided by personnel with lower than optimal levels of education; however, DVS reported that it was actively trying to recruit and fill remaining AHT and veterinary positions.

In July 2004, Namibia's Cabinet approved a new structure for DVS. The new structure is designed to strengthen the central competent authority and allow for closer supervision and decentralization of services. DVS believes that the new structure will increase the quality of surveillance and reporting efforts in the country. The Directorate will remain under supervision of a Chief Veterinary Officer and consist of four divisions that are each headed by a Deputy Chief Veterinary Officer. The divisions are:

- a) Animal Disease Control (Animal Health);
- b) Veterinary Public Health;
- c) Epidemiology, Import/Export and Training; and
- d) Diagnostic Services and Research, which will oversee diagnostic services, food science, research, and biotechnology.

Animal Health will have a Chief Veterinarian post for each of four regions. Each Chief Veterinarian will operate as a supervisor of a number of State veterinary officers (up to four each) and be responsible for training, control, monitoring, and guiding field veterinarians. There will also be six additional field veterinarian posts in the northern communal areas. In addition, the number of AHT posts (agricultural diploma level) will be increased from 79 to 95 with a plan to phase out stock inspection assistants over time. For operational purposes, Namibia divided the country into four regions listed as South, North-east, North-west, and Central. South will consist of Keetmanshoop, Mariental, Gobabis, and Otjinene State veterinary offices and suboffices. North-east will consist of Katima Mulilo, Rundu, Grootfontein, and Otavi State veterinary offices and suboffices. North-west will consist of Ondangwa, Eenana, Outapi, Onankali, and Opuwo State veterinary offices and suboffices. Central will consist of Omaruru, Windhoek, Otjiwarongo, Okahandja, and Outjo State veterinary offices and suboffices.

Veterinary Public Health will have one Chief Veterinarian who will provide supervision at an operational level and assist the Deputy at management level. A control veterinary hygiene inspector will assist the Chief Veterinarian. A new post of veterinary public health specialist has also been created. Additional posts of chief hygiene inspectors have been created to enhance supervision on the slaughter floor of abattoirs.

Epidemiology, Import/Export, and Training will also have a Chief Veterinarian who will assist the Deputy with administrative issues. There will also be a veterinary specialist in epidemiology and two veterinarians. One of these veterinarians will be responsible for the livestock identification and tracing system. There will also be a veterinarian in charge of import/export control, a chief veterinary technician, and additional technicians. Last, there will be 20 posts of veterinary officials who will be stationed at the main entry points. These posts have been approved, and DVS hopes to fill them soon. The veterinary port officials will oversee compliance with import requirements and notification of arrival of animals and animal products.

Recruitment to fill the positions has begun. Progress in filling the positions had been made as of January 2006, and efforts are ongoing [11].

Disease status in the region [2, 9,12]

The last FMD outbreak in the surveillance and free zones, the region under consideration for FMD-free status, was in 1965. The last outbreak in the buffer zone was 1992. However, on August 18, 2002, FMD was detected in the infected zone. Six head of cattle in a herd of 45 in Kasika exhibited lesions that were South African type (SAT) positive. DVS controlled the outbreak through movement control and vaccination with a trivalent (SAT 1, 2, 3) vaccine. All animals in the immediate vicinity of the outbreak were vaccinated twice, and the remainder of the animals in the infected zone were vaccinated once. Surveillance did not detect the presence of additional infected animals. The outbreak was declared over on March 31, 2003, after a 6-month period of not detecting any other FMD-infected animals.

Conclusion: At the time of the visit, FMD had not been diagnosed in either the surveillance or free zone since 1965. Vaccination has not been performed in the surveillance or free zone since that time. This represents a significant amount of time to be free from disease, considering the extent of the region under consideration. In addition, the control of the outbreaks in the FMD-infected region were adequately controlled.

Status of adjacent regions [1, 2, 8, 9, 13]

For the purpose of this review, adjacent regions fall into three categories. The first category is the region north of the VCF, which is considered the buffer zone and is adjacent to the region under consideration. The second category is the infected zone, which is not adjacent to the region under consideration. The third category is neighboring countries such as Angola, Botswana, and the RSA.

Buffer zone

The buffer zone in Namibia, which is the region north of the VCF, had its last FMD outbreak in 1992. The buffer zone is separated from the surveillance and free zones of Namibia by game- and stock-proof fences that make up the VCF. The buffer zone is free of free-roaming buffalo but contains communal farming areas. CBPP is present in this area.

Infected zone

The infected zone, which is the Caprivi area, is not adjacent to the surveillance and free zones (zones under evaluation by APHIS for FMD freedom); however, it is adjacent to the buffer zone. East Caprivi is considered to be endemically infected with FMD due to the presence of enzootic FMD in free-roaming African buffalo.

The infected zone is separated from the remainder of Namibia by the game-proof fence bordering the Muhango game reserve, which is the western end of the Caprivi Game Park, and the Okavango River. The last FMD outbreak in this area was in 2002. The infected zone is bordered by Botswana to the south, Zambia to the north, and Zimbabwe at the eastern tip.

Adjacent countries

The southern portion of Botswana is recognized by the OIE and Namibia as free of FMD. A game- and stock-proof fence separates the two countries in this region. Approximately 10 kilometers of the northern part of Botswana lies adjacent to the surveillance zone of Namibia. This portion of the surveillance zone, referred to as the “Gam area,” is separated by four fences (double game- and stock-proof fences) from Botswana and is under increased surveillance involving more frequent field visits (reported to be at 3-month intervals) to communities. According to the OIE Web site, Botswana had FMD outbreaks in 2002 and 2003.

The RSA has not had any known FMD outbreaks in the region adjacent to Namibia; however, the occurrence of FMD in the eastern regions was reported to the OIE within the last 3 years. According to the OIE Web site, the last FMD outbreak outside of the FMD-control area in the RSA was in 2001. There was also an outbreak in 2003; however, it was located in the FMD control area. Areas of the RSA that had FMD outbreaks are not in the proximity of borders with Namibia.

Southern Angola is adjacent to the northern region of Namibia’s buffer zone. According to the OIE Web site, an FMD outbreak occurred in Angola in 2001. In addition, the veterinary disease control situation in Angola is unclear. Although Angola may represent a risk for FMD introduction into the buffer zone, Namibia’s veterinary infrastructure and border controls would be expected to detect it.

Other

As previously mentioned, Namibia has an FMD surveillance zone that lies south of the VCF. As stated previously, the surveillance zone and FMD-free zone are the areas under APHIS consideration. The surveillance zone is a width of at least two farms deep. FMD and CBPP are not present in this region, and

vaccination against FMD is not permitted. This zone allows for surveillance of FMD in the absence of vaccination.

Conclusion: FMD is endemic in certain areas of Namibia and the adjacent countries of Angola, Botswana, and the RSA. The most recent report of FMD in the RSA has been in the FMD-control area, which is not adjacent to the region of Namibia that APHIS is evaluating. Despite the FMD status of surrounding regions, Namibia's surveillance and free zones, which is the region under evaluation by APHIS, has not had an outbreak since 1965. In addition, there is no recent history or evidence of introduction of FMD into Namibia from adjacent regions.

Extent of an active disease control program

Since there is no active FMD infection south of the VCF (surveillance and free zones), there is not an active disease control program beyond surveillance, movement controls, and emergency plans as described in subsequent sections of this review.

Conclusion: The disease control program emphasizes movement and border controls from outside the country and between zones, movement control within the region south of the VCF, surveillance, intensive and ongoing awareness campaigns, and routine review of all livestock. These are further described in subsequent sections of this review.

Vaccination status [1, 2, 4, 8, 9, 14]

Vaccination against FMD is not performed in the region south of the VCF (surveillance and free zones), which is the region under evaluation by APHIS.

In the buffer zone, which is FMD free with vaccination, vaccination coverage is 80 percent. FMD vaccinations are free and available only to DVS personnel for administration. Only cattle in the Kavango and north central area are vaccinated. The north central area consists of a strip of land approximately 50 kilometers wide adjacent to the Angola.

Vaccination occurs annually with an oil adjuvant bivalent (SAT 1 and SAT 2) FMD vaccine combined with CBPP. DVS identifies vaccinated cattle with an arrow brand, which identifies the year of vaccination.

Cattle in the eastern region of the Caprivi are vaccinated twice a year with a trivalent SAT 1, 2, and 3 vaccine; whereas in the western region of the Caprivi, vaccination occurs only once per year. Small stock are not vaccinated for FMD anywhere in Namibia.

In areas in which DVS performs vaccination (i.e., infected and previously identified areas of the buffer zone, north of the VCF), records are maintained for each herd owner by the State veterinary personnel in charge of the vaccination crew. Additionally, at the time of vaccination, the herd owner is required to present a stock card that identifies vaccinates, census, and movements [14]. The stock card is updated at presentation to record vaccinations administered. A stock card is a written record that remains in possession of the stock owner.

Stock card records are updated whenever there is movement, sale, slaughter, vaccination, or other significant events that take place for cattle and small stock. These records are available at any time for inspection by veterinary personnel.

The site visit team visited an area where vaccination was taking place. Vaccination is usually administered at specific gathering places. Communal owners, who are in the vicinity or come from a distance, bring their animals to the vaccination site. Cattle were hot-branded with an arrow brand to indicate when they were vaccinated. Stock cards were marked so that the individual stock owner had a record of the number of cattle vaccinated and the date of vaccination. DVS kept records for calculating the extent of coverage and maintaining accurate reports.

If the owner did not comply with the vaccination requirement, the infraction was reported to the “induna” (chief or headman of the area) who consults with the water committee. When this happens, the offending party is denied access to water for his or her livestock. In the communal areas, water access is vital and is organized by the water committee that answers to the “induna” of the community. If access is denied, the person who did not present his or her cattle for vaccination has to contact the State veterinary office to schedule vaccination of the cattle.

Angolan cattle that are brought into Namibia along the Angola border are vaccinated by DVS officials at the border post of entry and branded with an “A” for identification. These cattle cannot cross the VCF. The cattle are also branded with an arrow that tells DVS officials the year the cattle were vaccinated.

Conclusion: The region under evaluation by APHIS, i.e., the southern region of Namibia (surveillance and free zones), has not practiced FMD vaccination since the outbreaks in 1965. The unvaccinated status of these animals helps them serve as sentinels if the FMD virus were to enter this region. Due to the community education efforts of DVS, the cultural importance of livestock health, and the frequent interaction of AHTs and CAHWs, it is unlikely that clinical signs of FMD would not be reported.

As to portions of Namibia north of the VCF (region not under evaluation by APHIS for FMD freedom) that perform FMD vaccination, serology is not performed to detect subclinical carriers prior to vaccination. The possibility that vaccination masks FMD exists; however, the probability is small because the herd management style of the buffer zone is open range with no barriers to the unvaccinated (naïve) cattle in the southern portion of the buffer zone. The belief is that these unvaccinated cattle would serve as sentinels should the virus become present in the buffer zone.

Separation from adjacent regions [1, 2, 8, 9, 12]

Multiple internal fence areas in Namibia constitute control measures for an FMD incursion and would assist in control if an outbreak occurred. The northern portion of Namibia (buffer zone) is cordoned off from the south (surveillance and free zones) by the VCF. The VCF divides Namibia into two parts—an FMD-free zone and an FMD-buffer zone.

The VCF is regarded by Namibia as tantamount to an international border. The VCF is a double fence that crosses Namibia and separates the communal farming area in the far north of Namibia (the buffer zone) from the commercial farming areas to the south (the surveillance and free zones). The VCF consists of a 17- to 21-wire gameproof fence of 2.4 meters (approximately 8 feet) in height on the north side, a dead space of 10 meters (approximately 32 feet), and an 8-wire stockproof fence of 1.4 meters (approximately 4.5 feet) in height on the south side. There are about 2,200 kilometers (1,300 miles) of VCF, including portions that are no longer in use. In past years, DVS moved the VCF progressively northward. As the VCF moved, DVS left old portions of the fence in place to be used for movement control of animals and animal products in the event of an outbreak. (DVS is aware that if the region south of the VCF (surveillance and free zones) is recognized as FMD free, the VCF cannot be moved prior to notification and evaluation by APHIS.)

The VCF is designed to prohibit domestic and wild animal movement from north of the VCF to south of the VCF so that no cloven hoofed FMD-susceptible species of animal can pass into the FMD-free zone. An added advantage is that the VCF also prevents CBPP spread from north to south.

To enforce the requirement for movement permits and disease control measures at various points of the VCF, there are roadblocks at the gateposts and vehicle inspections. The gateposts are the only way to pass through the VCF. Gates located where major roads pass through the VCF allow traffic to move between the FMD-free zone and buffer zone but are monitored on a 24-hour basis by veterinary and police personnel who perform inspections to prevent incursion of prohibited animals, meat, or meat products.

The only other points where animals may move through the VCF are the quarantine stations. Quarantine stations are considered extensions of pockets to the fence and are not part of the free area. The site visit team had the opportunity to observe many kilometers of the VCF and determined it to be in good repair and of adequate structure to stop the movement of most animals.

However, in some locations, it appeared that there was a possibility that wart hogs could burrow under the fence. This may not constitute a major concern since movement of these animals is likely to be localized in the vicinity of the fence.

The fences are maintained by full-time repair crews who patrol the fences in search of breaches arising from game or human damage. In fact, DVS records VCF violations [12]. In the last 3 years, violations have consisted of such things as cutting the VCF, smuggling animals and animal products, and movement of stolen vehicles.

The area of Namibia south of the VCF (surveillance and free zones) is bounded by natural and manmade borders. The western coast of Namibia is bounded by the Atlantic Ocean and a very harsh desert that effectively prevents all animal movement. The southern boundary with the RSA consists of the Kalahari Desert adjacent to a large river (Orange River) in addition to a stock-proof fence.

Namibia is separated from Botswana's vaccination zone by double game- and stock-proof fences with gatepost roadblocks that act as livestock movement controls. The site visit team observed a border between Namibia and Botswana's OIE-recognized FMD-free zone. This area was separated by a game- and stock-proof fence. Both fences appeared to be in good shape; however, there was evidence of wart hogs digging under the fences on both sides.

As to Namibia's border with Angola, at the time of the site visit, an adequate fence was not present. However, a task force is in place to reestablish a fence along this border that was erected shortly after independence.

Conclusion: Separation from adjoining regions includes maintained game proof fences, roadblocks, and physical barriers of desert and rivers. These boundaries appear to be adequate as long as the DVS maintains active control of border posts and maintenance of the stock and game control fences.

Movement controls and biosecurity [1, 2, 4, 8-12, 15-33]

Animal identification

The Stock Brand Act of 1995 requires all livestock owners in Namibia to brand all cattle 6 months of age and older with a registered brand to identify their ownership and location. In addition, livestock owners

must brand all purchased cattle within 30 days of procurement. Each livestock owner is assigned an individual brand mark. The brand must be legible and recorded on the movement permit.

Permits are required for various types of cattle movement. Cattle sale or movement requires rebranding with the new owner's brand and recording on stock cards and DVS records. Animals retain all marks from previous owners. The order of the owners can be gleaned from stock cards and DVS records. The brands identify the animal at slaughter, and barcodes are assigned to allow tracing through processing. Tracebacks are possible on live animals by the brand and of processed products by the barcode listed with each container after processing at a slaughter facility. Farmers must register their brand mark with the Meat Board of Namibia, the organization that has been charged with administration of the brand mark system.

At the time of the site visit, there was no official tracking/identification system for small stock, except for those animals that were exported to the RSA. Small stock exported to RSA must be tattooed with the letter "N" in their ear to identify them as originating from Namibia. An identification system for small stock was being developed. DVS proposed to establish the use of owner-specific tattoos or eartags. Identification would allow the tracing of animals to the flock of origin. The proposal is to make amendments to the Stock Brands Act so that the Act also accounts for identification of small stock (sheep and goats). The stock must be tattooed or eartagged before the age of 3 months or earlier when weaned lambs leave a registered farm or premises.

DVS stated that the amendments to the Stock Brands Act would be published in March 2004 [10]. On March 29, 2004, the Ministry of Agriculture, Water and Rural Development amended the Stock Brands Act, and the revised Act was enacted on April 14, 2004. All small stock on all farms in Namibia must be identifiable by means of a readable tattoo and/or metal eartag bearing the registered brand mark of the owner when the stock reach 3 months of age or earlier if removed from the farm. DVS plans to initially enforce the mandatory identification when animals arrive at auctions and abattoirs, and begin incorporating enforcement as part of the routine veterinary farm inspection.

Movement controls

Within Namibia

DVS is authorized to control animal movements from farm to farm, farm to slaughter, and farm to auction. Noncompliance with movement regulations results in the restriction of market access for the farmers. DVS works with cooperation from the State police to operate roadblocks, control livestock movement, and, in the event of a foreign animal disease outbreak, to guard and isolate the infected area.

DVS requires and enforces strict movement control of animals in the free zone, surveillance zone, buffer zone, and from adjacent countries with veterinary movement permits. In fact, DVS can place movement restrictions on farms for not complying with official vaccinations or inspections.

There is also strict movement control of animals from premises to premises through veterinary movement permits. One copy of the permit stays with the veterinary office at the region of origin, one copy stays with the owner, one copy goes with the consignment, and one copy goes to the veterinary office at the region of destination to alert the office of the shipment. Records are available at each State veterinary office for each producer with summary statistics compiled electronically at the DVS office in Windhoek. A permit is also required for the movement of animals to slaughter. The movement of animals from the surveillance zone requires a red cross movement permit in addition to a 3-week quarantine at the farm of destination.

A red cross permit is a movement permit with a large red watermark to distinguish it from a regular movement permit. DVS uses the permit in cases where officials need to be alerted that there are conditions existing on the permit, such as quarantine at destination or that the animals or products must be transported in sealed vehicles.

Into Namibia

The Deputy Director-Epidemiology is the issuing authority for veterinary imports. A veterinary import permit and health certificate are required for the importation of animals and animal products into Namibia. Permits for animal products and certain live animals require seals on transport trucks or containers. Namibia does not import domestic animals or animal products from FMD-affected regions and countries where BSE has been reported. In addition, FMD vaccinated animals and certain products from these animals are not allowed into Namibia.

DVS has plans to identify imported animals (cattle sheep, goats, and ostriches) using a unique identification eartag and a brand [10]. In fact, DVS has instituted a registry system to ensure that imported animals can be traced from importation until death. Further, DVS plans to ensure that the cause of death is recorded for imported animals. DVS is requiring that efforts should be made to test the brains for BSE of all imported cattle after death.

DVS is in the process of creating a system to record incidences at Windhoek International Airport when products are refused entry because the necessary permit is not present. Items that do not have the necessary documentation are either destroyed or returned to the country of origin.

Movement of ruminants and certain ruminant products, including game animals, from north of the VCF to south of the VCF

From infected zone to buffer zone

Movement of cloven-hoofed animals can occur from the infected zone to the buffer zone if the animals are tested serologically, the serological test results are negative, and the animals undergo a 3-week quarantine.

From the buffer zone to free zone

Live cattle are not allowed to be moved from the buffer zone to the free zone. In fact, there have been no recent movements of cloven-hoofed game animals from the buffer zone to the surveillance/free zone. Game animals have been moved from the buffer/surveillance zone to the free zone after a 21-day quarantine.

Animals slaughtered in/from the buffer zone undergo antemortem and postmortem inspections for FMD lesions at slaughter. Beef from these animals is matured for 24 hours, and the pH must be below 6.0. Carcasses are deboned and lymphatics are removed. The beef is hard frozen before it leaves the plants and is held for 3 weeks before it leaves the facility. Meat product movement is allowed from the buffer zone to the free zone for local consumption. Meat is also allowed to move from the buffer zone to the RSA under permit and in a sealed conveyance. The meat must be produced at an approved abattoir and held for 3 weeks prior to shipment. The 3-week hold is placed on the meat in case of an undetected outbreak in the production area. This area is a concern because the buffer zone is large, and there are no

fences along the Angola-Namibia border. Three weeks is thought to be the amount of time it would take for an outbreak to occur and be detected.

Beef from the buffer zone is shipped in sealed trucks to the RSA and the free zone. Beef sent to the free zone may be further processed at a butchery. Barcode identification of boxes is mandatory and allows traceback to the slaughterhouse and herd of origin.

The movement of game animal products is allowed from north of the VCF to south of the VCF [16]. These products include, among other things, elephant ears, hides, feet, tusks, and salted elephant meat; buffalo skulls, horn, and skin; hyena skins; and lion skulls and capes.

Untreated hides are only allowed to be moved from quarantine abattoirs at Oshakati (buffer zone) and Katima Mulilo (infected zone), and untreated hides from elsewhere may be consigned to areas south of the VCF if they have been dried and quarantined under veterinary supervision for 3 months [10]. According to the conditions required by the veterinary permit for movement of hides and skins north of the VCF to the free zone [15], the hides and skins must be accompanied by a permit as well as a red cross permit (previously described in this document). For untreated hides, the truck must be sealed and proceed immediately to an approved tannery for unloading under supervision. The hides must be packed in airtight containers that are sealed under veterinary supervision. Immediately after loading, the State veterinarian must be advised of the probable arrival time of the shipment to the tannery. At destination, the seals are broken by a State veterinary official who must ensure that the hides enter the tanning process, which will inactivate the FMDV.

As to treated hides, they must also be accompanied by a movement permit as well as a red cross permit. According to the veterinary permit, treatment involves quarantine under official veterinary supervision for 3 months or treatment with sodium carbonate (Na_2CO_3) followed by a 1-month quarantine under official supervision. (Additional acceptable treatment methods are also described [10].) Treated hides and skins originating from Angola may be moved to an approved tannery only in Okapuka (free zone) or Nakara. Treated hides and skins that originate from Namibia have unrestricted movement after crossing the VCF into the free area.

Movement of small stock (sheep and goats) within Namibia

Small stock are moved from the buffer zone to the free zone. All small stock that had been moved from the buffer zone to the free zone had originated from an area that does not vaccinate cattle for FMD. The small stock are not vaccinated or tested for FMD prior to movement, but there is a 3-week quarantine in the buffer zone along the VCF and examination of the animals after quarantine. The quarantine stations are Omutambo Maowe, Khowarib, Oshivello, and Mangetti East. As of June 2003, there were no sentinels in the quarantine facility. When moved to the free zone, the animals must undergo a 3-week quarantine at the farm of destination or proceed directly to a slaughter facility. Small stock moved for slaughter are for local consumption and not for export; therefore, the animals, if transported to a slaughter facility, are not slaughtered at export slaughter facilities.

DVS provided the number of small stock per quarantine station moved to areas south of the VCF from 2000 to June 2003 [12]. More than 3,000 small stock per year (2000, 2001, and 2002) were moved from the buffer zone to the free zone. As of June 2003, 1,178 were moved.

For the movement of these small stock, a permit is sent to the district DVS veterinarian at the point of destination. The district veterinarian ensures that isolation facilities are prepared on the farm of destination. Animals cannot be unloaded until the seals are broken at the destination point by the district

veterinarian. The animals cannot be moved within 3 weeks of arrival. The animals must be isolated but are not under quarantine from contact with other animals on the premises. Other animals on the premises are allowed to be removed from that premises prior to completion of the 3-week isolation period of the isolated animals.

As stated previously, small stock on farms must be identifiable by a readable tattoo and/or metal eartag bearing the registered brand mark of the owner when the stock reach 3 months of age or earlier if removed from the farm. Transport vehicles are cleaned and disinfected at the VCF and after offloading. DVS officials stated that the movement of small stock from the buffer zone to the free zone would stop if an FMD outbreak occurred.

The site visit team visited the Mangetti quarantine camp in the buffer zone near the VCF, and it was found adequate for isolation of animals. The mouths of the animals are inspected for signs of vesicular disease upon entry and exit from the camp and observed for other signs of disease. However, due to the presence of large, brushy vegetation in the camp, the observance of mild clinical signs of FMD would be easily missed or assumed to be damage caused by the vegetation. In species such as sheep and goats, clinical signs of FMD may be mild or nonexistent in spite of the animals actively harboring the virus. These issues could present a risk for FMD introduction.

The site visit team identified a risk of FMD incursion due to small stock entry from the buffer zone to areas south of the VCF without serologic testing prior to movement. However, in response to the concern, DVS stated that it intended to house seronegative sentinel cattle in all the quarantine stations effective January 2004. DVS also considered broader serosurveillance to establish the status of all small stock in the northern communal areas. In fact, in December 2003, DVS began using sentinel cattle during the quarantine of small stock. Small stock are penned with the cattle. The cattle are seronegative and retested after 21 days. Small stock are only released when test results are negative. Small stock that have completed the minimum 21-day quarantine, but are not destined for immediate slaughter, are not released until 90 days later. The animals may be held at official quarantine facilities or at approved facilities at the farm of destination. At the farm of destination, quarantine must be in a double-fenced quarantine facility or the entire farm is quarantined with the small stock restricted to an inside camp. Broader serosurveillance in small stock has not been initiated as of January 2005. However, serosurveillance for FMD in cattle in the infected and buffer zones began May 2004, to detect natural infection by testing for nonstructural protein antibodies. In the buffer zone, serosurveillance was aimed at confirming the absence of FMD; and in the infected zone, serosurveillance was aimed at assessing the effectiveness of the vaccination program.

Movement of Animals from Angola

There is movement of animals from Angola to Namibia. There are border entry points for people who bring animals into Namibia. The entry points are at Oshikango, Ruacana, and Mahenene. At these entry points, one of which was visited by the site visit team, DVS examines and vaccinates the animals for CBPP and FMD prior to entry.

The site visit team visited the Ruacana border post with Angola. After the animals are vaccinated at the post by DVS personnel, Angola animals are hot branded with an "A" and an arrow brand to identify the year of vaccination. They are not quarantined; however, they must remain in the buffer zone. They are not allowed to enter the free zone.

Animals imported from Angola are mainly used for local slaughter or enter Namibia for seasonal grazing and return to Angola. Animals that were originally from Angola can return to Angola and later reenter

Namibia. Some of these animals may be used for breeding, but they must remain in the buffer zone. Imported animals are not allowed to enter the market channel. If the cattle are slaughtered in the buffer zone, the meat must stay in the buffer zone and cannot enter the free zone. DVS officials can determine whether the animal is current on its vaccination because of its arrow status.

DVS officials stated that they are aware that remaining regions of Namibia will not achieve recognition of FMD freedom unless disease in Southern Angola is eliminated. DVS officials stated that they have never detected FMD lesions on the animals entering from Angola; however, vaccination is performed because officials are not sure of Angola's status. DVS and Angolan veterinary officials hold a biannual meeting to discuss issues of mutual concern.

The site visit team noted that small stock that were not identified could easily commingle with local animals and potentially move through the quarantine camps to areas south of the VCF. However, the movement of small stock from the buffer zone to areas south of the VCF is preceded by a 3-week quarantine north of the VCF and an additional 3-week quarantine at the farm of destination if the animals do not go directly to slaughter. With the implementation of sentinels at quarantine stations, APHIS considers that any FMD concerns regarding Angolan animals that may be sent south of the VCF are addressed.

However, the institution of an identification system for Namibian small stock mitigates the risk of infected small stock from Angola being moved south of the VCF. Also, the animal permitting system will further enhance traceability.

Import of animals and animal products from the RSA

Animals are primarily imported from the RSA or transit through the RSA. Most of the imported cloven-hoofed game came from the OIE-recognized FMD-free zone of South Africa [10].

There was a bilateral agreement between the Governments of Namibia and the RSA that originated in 1990, which allowed the importation of animals and animal products on a system of Master Import Permits rather than an import permit for each consignment. Shipment of each consignment was based on agreed veterinary conditions. The main conditions were: a) Animals and animal products were to be accompanied by a veterinary movement permit/health certificate or import permit when applicable; b) State veterinarians of each country could certify for movements of animals and products after ensuring the permits/health certificates were issued in terms of the agreement; and c) copies of movement permits for cloven-hoofed animals were to be faxed to the State veterinarian at destination.

This system was abandoned following the FMD outbreak in the RSA in 2000. After this time, import permits were required for all cloven-hoofed animals and their products from the RSA. Because permits were not required for each consignment prior to 2000, DVS' central records do not reflect all of the animals and animal products that were imported from the RSA prior to the introduction of import permits for individual consignments.

After the FMD outbreak was under control, permits for low-risk products such as dairy products and processed (cooked) meats were waived. Since June 2001, the RSA has provided import permits for all animals and animal products for commercial use. DVS finalized import permits for animals and animal products from the RSA. These permits are referenced further in this document.

The volume of animals imported from the RSA and specific import requirements for various commodities from the RSA are described in Appendix 3.

Importation of animals from regions other than the RSA

Namibia does not allow the importation of animals from regions under FMD restrictions. In addition, FMD-vaccinated animals are not allowed to be imported. Also, all imported cattle are permanently branded and not accepted for slaughter at export slaughter facilities. Though animals are primarily imported from or via the RSA, there is a veterinary permit in existence for the importation of cattle from countries other than the RSA. Although this permit has not been issued recently [10], its restrictions are described. (Please see Appendix 4 for the requirements for the importation of cattle from regions other than the RSA.)

The only recent imports of live sheep, goats, and pigs into the free region were from the zone of Botswana considered by Namibia to be FMD free [10]. These animals belonged to Namibians who were residing in Botswana before Namibia obtained independence and required import permits and veterinary health certificates. (Please see Appendix 4 for the requirements for the importation.)

There are import permits for game animals imported from Botswana and other countries to Namibia [30, 33]. (Please see Appendix 4 for the requirements for importation.)

Importation of meat and meat products

Namibia imports fresh beef, mutton, pork, processed meat, and other animal products from various countries, including the RSA [18]. (Please see Appendix 5 for the volume of fresh beef, mutton, pork, and processed meat; countries of origin; and volumes of imports. In addition, Appendix 5 includes permit requirements for these products.)

Bergvlug quarantine farm

The site visit team visited the Bergvlug quarantine farm as a representative quarantine facility. The quarantine facility, which is owned by the Government of Namibia, is approximately 30 kilometers from Windhoek. The quarantine manager and his family live just outside the gate of the facility, which allows for close supervision of the facility. In addition, DVS-owned farms surround the quarantine premises.

The facility is mainly used for horses; however, it can be used for dogs, cattle, birds, game, etc. Birds are kept in an area that has filtered air. Horses are kept enclosed within the facility.

Animals entering the facility are recorded by permit number, date of arrival, owner address, species, number of animals, period of quarantine, tariff amount, and country of origin. Electrical fences surround areas that hold small stock to prevent the entry of predators.

There is a laboratory on the premises that is used for research animals. It is also used for some postmortem exams.

Some deterioration of the facility was noted by the site visit team. The site team noted cracks in the wall and peeling paint in a couple of the rooms that are used to house birds, cats, and dogs. DVS stated that there is money available to make repairs.

The facility is vector proof; however, it did not have double-entry. Cleaning and disinfection equipment and supplies were present. There was also an incinerator on the premises.

The site visit team observed several ports: Windhoek International Airport and Transkalahari Post in Buitepos. Generally, compliance with import requirements is the responsibility of Customs officials, although DVS personnel are involved in certain issues, some of which are described in the discussion below.

Customs at Windhoek International Airport

The Customs official interviewed was not properly versed on the duties of Namibian Customs in protecting the animal health sector of Namibia. He was aware that certain plant products must be confiscated; however, his knowledge of animal products that should be confiscated or not allowed entry was lacking.

In addition, the airport did not have signs or posters on display that provided warnings or guidance on animal products that can or cannot be brought into Namibia. There were also no checks on the garbage offloaded from planes. This airport receives direct flights from Frankfurt, Munich, Capetown, Angola, Johannesburg, and Botswana.

Transkalahari Customs Border Post in Buitepos

Customs officials at Transkalahari were aware and knowledgeable of DVS requirements for animals and animal products entering Namibia. There is voluntary declaration of goods; however, vehicles and luggage are searched, if necessary.

Permits are required to be presented to the Customs officials for live plants, and a permit/health certificate is required for meat. If meat originates from the RSA, officials may ask for a certificate of verification that the meat is entering the country in accordance with the Namibia and RSA agreement (coming from the free area). The requirement for a permit varies with the amount of meat being imported. In this regard, less than 25 kilograms of meat from the RSA is allowed without a permit or health certificate if for home consumption. If the amount is between 25 and 500 kilograms, a permit is required. Shipments of more than 500 kilograms of meat must have an import permit and a health certificate. Namibia does not have a negotiated import agreement with Botswana.

If a small quantity of biltong is carried by a passenger, Customs officials have the person consume it in their presence. If a large quantity is carried by a passenger, the person must have a certificate or it will not be allowed entry.

Game prizes/trophies require an import permit to be brought into the country. The police also search cars and will call the Customs officials when they find plants or meat so that the products can be verified as satisfactory for import.

Customs officials stated that meat is confiscated on average about once per month. Confiscated meat is destroyed in the presence of the owner at the burn pit that is adjacent to the border facility. Fruits and vegetables that are confiscated are also burned.

Documents accompanying animals entering Namibia are checked to ensure that an import permit from Namibia is included. Customs officials verify that the animals meet the conditions on the import permit if possible, but it can be difficult to see all of the animals since they are in sealed trucks. Officials make sure the seals are intact. The DVS veterinarian accompanying the site visit team told Customs officials that DVS should be called to obtain authorization to offload the animals and provide notification of the change of movement. However, in the past, Customs officials have not contacted

the DVS when they have had to offload animals for any reason. In these circumstances, Customs officials broke the seal and replaced it with their own.

If there is a problem with the import permit or animals, though it had not happened by the time of the site visit, they will call DVS, especially since there is a DVS veterinarian in Gobabis.

Customs at Walvis Bay

At this post, importers, exporters, or agents submit documents to Customs, and Customs enters any goods subject to a permit into its recordkeeping system. Customs currently evaluates the acceptability of import documents based on a guideline that describes prohibitions and restrictions entitled, “Consolidated List of Prohibited and Restricted Imports.” This guideline was created by officials in the RSA. In the future, Namibian officials hope to have one specific to Namibia.

Customs officials receive waybills/manifests and ensure that the shipment matches information that is on the documents. Customs considers itself the eyes and ears for line ministries. Customs checks the nature of each commodity to identify the ministry responsible for the permit for the commodity.

There are boxes in the front office for documents relating to Customs clearance. Customs officers use these boxes to notify plant health or the State veterinarian office (animal health) of incoming shipments. Customs will stop a commodity for examination by the State veterinarian. Customs officers are aware that, if a shipment manifest says animal or animal products, a DVS State veterinarian needs to be made aware of it. Customs officers are also at the harbor gate through which the commodities leave the port to ensure that the State veterinarian has released an item.

This port receives processed skins from north of the VCF in sealed containers. The State veterinarian ensures that seals are intact upon arrival and ensures that the paperwork is in order prior to being loaded onto a ship.

Passenger ships arrive mainly from November to April, and only a few people disembark. Spot checks are performed to detect animal or plant materials in passenger luggage.

There could be a risk of disease incursion due to lack of consistency at points of entry into Namibia regarding the entry of animal products. However, to address the lack of consistency, DVS had initiated several actions. On June 26, 2003, DVS issued a letter to the Director of Customs and Excise regarding animal and animal product control at international points of entry. DVS advised Customs of the disparity of how animal products are handled at the Hosea Kutako International Airport. DVS also advised Customs that it has appointed an official to visit various entry points, evaluate control measures, and discuss relevant issues with all authorities to ensure compliance with Namibia’s veterinary import requirements. In addition, DVS will have the State veterinary staff visit entry points in their designated districts for the same purpose. DVS will also become involved in the training of Customs officials on the requirements for the importation of animals and animal products. The first training course occurred on January 31, 2003, and an additional course occurred on January 29, 2004.

To further enhance the awareness of the import of animals and animal products, DVS advised State veterinarians, among other personnel, that attention should be given to departure airstrips from places such as lodges to ensure that people who are departing the area are acquainted with the danger and restrictions of transporting animals or animal products to the FMD-free zone. DVS received approval to establish 20 posts that will be staffed by veterinary port officials. These posts would be at main entry

points. These veterinary port officials will oversee compliance with import requirements and notification of arrival of animals and products.

DVS is negotiating the display of information boards at points of entry to acquaint arriving passengers with items (animal products, etc.) to be declared to Customs officials.

Walvis Bay Veterinary Services office

The State veterinarian is stationed at the Walvis Bay Veterinary Services office. On the premises, a quarantine facility is used for dogs, birds, and cats. It is no longer used for larger animals.

The functions of this office include, in addition to maintaining the quarantine facility, surveillance for animal diseases, monitoring the import and export of animals and animal products, and issuing permits for the movement of animals. All animal products that arrive at Walvis Bay require an import permit, which is issued prior to arrival.

For products that enter the country at the port, this office maintains a record of the date of entry, permit number, origin, quantity, and description of the product. This office also performs inspections of cold storage facilities through cooperation with fisheries and plant health.

Personnel from this office also have veterinary responsibilities in the field. For example, the office is responsible for performing farm inspections on an annual basis for its assigned area.

As previously stated, Customs ensures that the proper ministries are notified of the arrival of shipments. In some cases, Port Control will come to the DVS office or place a note in the DVS box when they want the State veterinarian present when the shipment arrives. The central office of DVS will also fax a copy of an import permit to the office to advise the office of a shipment that will be arriving. Only the veterinarian employed by DVS can break the seals on commodities under DVS jurisdiction.

The central DVS office sets the criteria for countries that are disease free and assigns disease status to countries. The State veterinarian did not have a list of countries or areas that DVS considers free of certain animal diseases. However, the site visit team was told that, if there is a disease outbreak in a country or area after DVS has issued a permit, DVS will cancel the permit and call the port to advise officials that the permit was canceled.

When the State veterinarian checks the shipment, he or she checks the expiration and product dates, endorsement of the permit, and the physical appearance. If everything is satisfactory, the veterinarian releases the shipment to the owner. If something is not satisfactory, the owner is given the option of destruction or return of the shipment to the country of origin. If the product is destroyed, the State veterinarian, police of the municipality, Port Control, and Customs are involved.

The last time a shipment was destroyed, the incident involved chicken. The chicken was destroyed by mixing with sand and buried in a 5-meter hole at the municipal dump. The dump does not have fencing but is controlled by municipal security. So far, the port has not had an incidence of beef or lamb being confiscated. Veterinarians at the port will sometimes hold a consignment until paperwork can be completed. However, they do not open containers until all documents are present. At that point, the veterinarian will open seals to verify contents.

The State veterinarian also looks at the paperwork if export products have to enter cold storage. If the shipment is in a sealed container with its own refrigeration unit, the container will be plugged in and kept cold until ready to load.

The harbor is totally fenced off, and there are guards at the port gate. If the release papers for a shipment that is exiting the gate are not stamped, the guards will stop the shipment so that it cannot leave the harbor.

International garbage is collected for disposal at the port. Collection and disposal of garbage in the harbor are contracted to a private company that dumps the garbage at municipal dumps. It was not clear how or whether garbage was treated prior to disposal. The site visit team noted that a cargo ship was unloading its garbage into a garbage bin that was on land at the port. The site visit team was told that Port Health destroys leftover food. However, the site visit team was also told that the garbage is loaded into the bins and taken to the municipal dump without treatment. There was also uncertainty as to whether the contractor directly delivered the waste to the municipal dump or diverted to someone who owned pigs.

The site visit team asked DVS for clarification regarding disposal of international garbage collected at the harbor. The team raised the concern because it is possible that, if FMD were reintroduced into Namibia, disease might be spread through animals scavenging unmonitored garbage dumps. DVS submitted information verifying that the collection and disposal of refuse in the harbor at Walvis Bay have been contracted to a company that dumps the refuse at municipal dumps. The refuse is covered with soil. DVS and Ministry of Health officials perform spot checks.

Oshivello gatepost

The site visit team spent several hours at the Oshivello gatepost and observed vehicle inspection by a combined force of police and veterinary officials. The post is staffed 24 hours per day, 7 days per week. All vehicles are stopped, livestock and animal product conveyances are inspected, and drivers are required to show movement permits. Vehicles that are suspected of carrying contraband are searched.

Individuals with meat products are required to cook the meat products or dispose of them before proceeding. The gatepost DVS personnel provided logbooks and documentation of contraband seizures and livestock movements. Records appeared to be neat, orderly, and complete with the exception of the contraband seizure log. This log had relatively few entries with a total of less than a dozen for the last 6 months. This may be an indication of either negligence by inspectors or a lack of contraband movement.

Police checkpoints

Police checkpoints were noticed in various areas while driving through Namibia. In addition to other duties, police will check truck permits. Police will check papers, including those of livestock trucks, to ensure the presence of permits. Sometimes DVS personnel join them. DVS believes that its presence reinforces to police that DVS is interested in the permits being checked.

Conclusion: Animal and product movement is well controlled at the local level through a permit system. The animal movement permit system, the FAN identification requirements, roadblocks, slaughter inspections, and quarantine stations provide good movement control. The greatest strengths of DVS include the authority and practice of farm visits for the review of livestock health, tracking animal movements, and conducting census evaluations for herd numbers and disease losses. In addition, information and data flow among Federal-State-private sectors is evident

Risk Factors: (1) Importation of fresh meat from countries considered by the United States as affected with FMD. (2) Importation of milk and milk products from regions or countries that the United States considers affected with FMD. (3) Importation of cooked meat from regions or countries that the United States considers affected with FMD. (4) Importation of hides, skins, and trophies from regions or countries the United States considers affected with FMD.

Livestock demographics and marketing [1, 2, 4, 5, 8-12, 34, 35]

According to 2004 livestock census figures, as of December 2004, FMD-susceptible livestock consisted of 2,349,700 cattle, 2,619,363 sheep, 1,997,172 goats, and 52,624 swine. The census is accurately maintained by annual farm inspection and census visits. FMD-infected free-roaming buffalo are located in the Caprivi area. All free-roaming buffalo in Namibia that were north outside of the Caprivi area in the buffer zone have been fenced in, tested, and are free of FMD. These animals are not allowed to be moved south of the VCF.

Cattle are predominant in the north (north of Windhoek), while sheep farming is more common in the south. Livestock are maintained throughout the free zone on large privately owned farms with the exception of a communal (open range) area in the western part of the Omaruru State veterinary district. The communal farming area in the buffer zone does not have legal fences; therefore, livestock grazing is on open communal land. Communal farming is largely for sustenance. The large farms comprise 10,000 to approximately 50,000 acres and are uniformly fenced.

Cattle from these farms are marketed at local slaughterhouses or auctions that are conducted at permanent facilities located in larger cities. In either instance, animals are moved under permit and inspected at destination by DVS. Farmers selling or trading stock within the free zone are also required to obtain a movement permit. Within the commercial farming areas, there are a few areas of communal land. For purposes of animal disease management and control, such communal areas are treated as one farming unit.

There are game farms in the FMD-free area, but none of them have free-roaming African buffalo. Stock theft remains one of the biggest causes of livestock loss, and predators are another cause of loss.

Namibia imports live animals from RSA; however, these animals are not allowed to be processed at export slaughter facilities.

Swine population

Swine production is rudimentary and expensive because feed has to be imported from the RSA. As a consequence, a small number of swine are raised in commercial facilities. These facilities must comply with African swine fever (ASF) regulations for double fencing to decrease contact with warthogs that may be affected with ASF. Swine commercial facilities are visited every year by an animal health inspector. Feeding swine origin material to swine is prohibited, and commercial piggeries do not feed swill to pigs.

A few people purchase fattening pigs for Christmas for their own consumption. These people do not have to comply with the ASF regulations for double fencing. However, they must have a permit to move the pig to their premises. Although the pig purchased for this purpose must be slaughtered by a certain date, DVS does not confirm whether the pig was slaughtered.

Livestock auctions

DVS provided a list of formal auction sites [12]. Larger auction facilities are registered with the Animal Health Department. DVS attends all sales that sell animals from more than one source. DVS inspects animals and issues movement permits. DVS also collects permits and checks the permits for endorsements, brand marks, and animals in corrals. Game animals may also be present at the auction. If game animals are present, the Nature Conservancy within the Ministry of Environment and Tourism must also be present.

DVS is not present if someone sells animals from his or her own property. In these instances, most of the time, the buyer will come to the State office to get a permit for movement of the animal(s) purchased. Auctions in the communal area may take place at any location, but DVS must be notified ahead of time.

DVS inspects animal transactions and issues permits for movement. In addition, the animal owners must present their stock card to DVS to record the movement and change of ownership.

Wildlife

Game animals are prevalent in all regions of Namibia. Officials indicated that wildlife in Namibia are believed to be free from FMD, although no FMD serological surveys in wildlife have been carried out in the free zone.

Serological surveys of sable antelopes (1996) and free-roaming buffalo [34, 35] in the confined area of Tsumkwe (located in the buffer zone northeast of the VCF) were completed. In 1996, a herd of buffalo was tested for FMD to establish its FMD status prior to movement into a fenced-off buffalo camp in Tsumkwe. All 29 animals were negative for antibodies to SAT 1, SAT 2, and SAT 3. The herd remained closed and was retested in September 2002. By this time, the herd had grown to 68 animals. All tested negative for antibodies to SAT 1, SAT 2, and SAT 3 using an enzyme-linked immunosorbent assay (ELISA).

Captured animals are certified clinically free of disease before movement. The Department of Natural Resources within the Ministry of Environment and Tourism is the responsible body for managing game capture and movement. The site visit team visited the Etosha game park located north of the VCF. The game park is separated from domestic livestock with double fences similar in structure to those previously described. There are no Cape Buffalo species, and access to visitors with FMD-susceptible animals or animal products is unlikely. Therefore, Etosha is an area of minimal risk for introduction of FMD to areas south of the VCF.

Farm visits

The site visit team visited various types of farms in several different parts of the country. These included multispecies farms with game animals. The farms were located in the FMD-free zone.

Cattle/Game Farm

The site visit team visited a dual-purpose farm that contained cattle and game (waterbuck, wild pigs, dikers, kudu, oryx, hartebeest, springbuck, dik-dik, steenbok, giraffes, and impala). Game was added 5 years prior to the visit. The owner recorded animal movements to and from the premises. In addition, the owner maintained records on a monthly basis as to number of deaths, head counts, births, and animals that

went to slaughter. The cow-calf operation has approximately 1,600 head. The animals are vaccinated every year for brucellosis, lumpy skin disease, and anthrax. Every 3 years a rabies vaccine is administered. The stock inspector, who works for DVS, visits the farm every year to inspect the premises and cattle.

Farm workers have one or two cattle on land owned by the farm owner, and all cattle are under the same type of management. These animals receive the same vaccinations as the farm owner's animals. The farm owner receives educational information on animal diseases, including FMD, from the farmer's association. The farm owner knew the procedures for contacting the State veterinarian and animal health inspectors. (The farm owner and family were aware of FMD. The farm owner's mother had been on the farm when the area experienced an FMD outbreak in the 1960s.)

The owner stated that movement permits are always requested when needed for his cattle. The day before sale, farm workers will hold cattle in a smaller camp that is closer for loading. The cattle truck is owned by the farm, and all movement is in this truck. The truck is not loaned to other farmers. The farm is also used for game hunts. Trophies are taken, and the game meat is made into biltong on the farm and used for farm workers, family, and guests. Game is dressed outside of the pasture area. All purchased game used at the farm came from the Waterberg area, which is south of the VCF. All game movement is overseen by the Nature Conservancy. In fact, capture and movement permits are required for game animals. On this farm, game is not restocked. It is a closed game herd. Hunting controls the population along with sicknesses that may affect the animals, including plant poisoning.

Sheep/Game Farm

The site visit team visited a farm that contained sheep and game. The owner had Dorper sheep, which are a cross between Dorset and black headed Persian sheep. There were 1,500 sheep including lambs. The animals are maintained on the fields all year round. Lambs are kept for up to 5 months and sent to slaughter. Restocking is through agents, auctions, and the owner's other farm. Sheep destined for slaughter are moved to the paddock area the day before loading. He uses controlled breeding and lambing season because he wants the sheep to lamb when the grazing conditions are good.

The owner also had game on the premises. Some of the game present on the farm included springbuck, oryx, and blue wildebeest. He works closely with the Nature Conservancy on census of game on premises, game movement, and culling.

The Nature Conservancy issues permits for the movement of game from the premises. With permission from the Nature Conservancy, he has used night culling to depopulate springbuck when there was an overpopulation. (Night culling is the hunting of animals at night.) The night cull team is registered with the Nature Conservancy.

Animals are brought to a mobile facility for slaughter. A veterinarian is present at the mobile slaughter facility. In the mobile facility, the heads, legs, and intestines are removed from the game. A cooling truck is used to store the animals and transport them to an abattoir. At the abattoir, the hide is removed, and carcasses are prepared. Trophy animals are slaughtered at a slaughter site outside of the pasture area.

DVS inspectors visit the premises every year. The owner rounds up all of the sheep for the inspector. For inspection of the game animals, the owner drives the inspector around the premises.

Inspectors complete a farm visit form for each premises that they visit. The farm visit form includes information pertinent to animal health such as vaccinations used, parasite treatments, mortality and diseases in stock and game, and lick supplement status. The farm visit form includes areas pertaining to the farm name, number, and district; however, the form lacks an area to record the brand identification of the animals.

Owners of premises maintain detailed records. In this case, the owner showed the site visit team movement permits for rams he recently purchased at auction. His records included all animal movement permits. The records were updated on a monthly basis. He records the death of an animal if he is aware of the death and the cause; however, he stated that he usually finds only skeletal remains. Under those circumstances, the cause of death cannot be determined. He performs autopsies on animals that die on his premises.

Okapuka feedlot

The site visit team visited a feedlot that is owned by Meatco abattoir. The feedlot helps to ensure a steady slaughter line and holds cattle when Meatco cannot place the cattle in its slaughter line. All cattle enter the premises on a movement permit. This feedlot receives cattle purchased only from sources located south of the VCF. Sources are direct marketing from farmers, communal areas through permittees, and auctions.

Purchased cattle are usually 8 to 12 months of age and will remain on the premises for 3 months. Newly entered cattle are placed in a starter pen. The feedlot operates on an all-in-all-out policy according to the lots. Upon entry, cattle are branded, eartagged, dipped, and vaccinated for anthrax, several clostridial diseases, pasteurella, and infectious bovine rhinotracheitis (IBR). All cattle are dewormed. They are also checked every day for signs of sickness. Sick cattle are pulled from the herd.

Of the cattle on the feedlot, 15 to 20 percent are female, and the remainder are male. Cattle are pen fed. This is a dry lot at all times. All cattle are on a mixed ration diet. The ration is completely vegetarian with no fish, poultry, or mammalian byproducts. This feedlot maintained records of cattle as to dates of arrival, departure, disease diagnosis, and death.

The DVS stock inspector visits once a month to every other month to check permits and compare the permits with those that are on file. Though the feedlot is a Meatco feedlot, the feedlot must apply for a slaughter time and date like all other herd owners. This feedlot supplies both Meatco export facilities in the free zone.

The site visit team noted that there was a lack of certification of brand marks on farm visit forms. The team expressed this concern to DVS officials. At the time of the site visit, DVS stated that, at the next reprint, farm visit forms will be revised to include the documentation of brands. Until that time, AHTs have to check for brand marks as part of the inspection protocol. If animals are not properly branded in terms of the Stock Brands Act, the farms are closed.

Abattoirs

The site visit team observed conditions at several different abattoirs. These were Farmer's Meat Packers and Meatco. They were observed as representatives of abattoirs that could be eligible to export to the United States. Export abattoirs are under direct supervision of DVS officials. On arrival at an export abattoir, the cattle are inspected for clinical signs of illness by veterinary staff. All animals also undergo

an antemortem inspection during which they are specifically checked for signs or lesions suggestive of FMD. At postmortem, the feet and tongues are inspected for FMD lesions.

Farmer's Meat Packers

Goats, lamb, sheep, and small game are slaughtered at this facility. The facility uses a hazard analysis and critical control point (HACCP) program. Approximately 1,200 sheep per day are slaughtered with a maximum capacity of 1,500. The facility can process 400 game animals per day, and 250 debonings for lamb and game.

The veterinary health inspector checks the animals for signs of illness or lesions. If there is a problem, the inspector calls the State veterinarian.

This facility receives animals only from farms that are inspected every year by DVS. All sheep from the same owner are marked. Paint marks are used if there is no other identifier on the animals. Tags (colored) are used to mark where new ownership begins. The animals are then tagged with a scan tag. The person who scans has a list of owners and the number of animals.

All owners are assigned a unique code/identifier. The arrival sheet contains veterinary exam results and notes. They can trace the owner based on the time recorded in the deboning room. Animals that arrive dead or die before slaughter are taken to the dump site and burned and buried. The veterinary health inspector has to supervise. If an animal dies in the pen under suspicious circumstances, tests are performed, and a necropsy is done. The veterinarian of the abattoir performs the necropsy and will call the State veterinarian if there is a suspicion that the cause of death is contagious to other animals.

There is also a high incidence form. The high incidence form is completed by the abattoir when a large consignment has a 5 percent incidence, or a small consignment has a 10 percent incidence of listed conditions such as metritis, pneumonia/pleuritis, icterus, peritonitis, lymphadenitis, hydatidosis, measles, and pregnancy. This facility maintained a list with codes for various animal diseases; however, vesicular diseases were not on the list. When asked why, officials said that the reason was unknown.

Carcasses remain in the chiller for 24 hours. The pH is usually 5.4 to 5.5, when checked. The pH is only checked if it is a requirement for the receiving country, and the shipment is intended for export to that country. Carcasses must be 4° C. The facility has three chillers. A representative from the Namibian meat board performs grading.

Boneless meat is intended for international markets (Norway and the European Union (EU)). Trimmings from prime cuts go to Norway for further processing. Other trimmings are provided to local markets.

Sheep skins are salted at the facility in a dedicated building prior to shipment. The sheep skins are kept for approximately 2 weeks and sent to Port Elizabeth, RSA, for further processing.

As to game, this abattoir mainly processes small game animals such as springbuck. The site visit team observed the springbuck cull area where carcasses are brought after culling at the ranches of origin. Live game animals do not enter this facility. There is a cooler, exam area, and offloading area for game. The pH of carcasses is not measured unless the market requires it. Meat from game animals is shipped to Norway and RSA.

Sheep and game are dressed on the same line but not at the same time. Game and sheep are dressed separately. In between the separate dressings of game and sheep, the equipment is cleaned. The VHI

checks the equipment to ensure that it is cleaned and that there is a break in slaughter between the game and sheep.

People who work in the clean area are not allowed to mix at all with the employees responsible for slaughter during work hours. They have separate facilities and are kept under lock and key (literally) even when on outside breaks. The break area outside was locked to prevent access by the slaughter side employees or egress of the “clean area” employees.

There are employees who continually clean surfaces between every 15 carcasses. Fifty samples per day are sent to the Central Veterinary Laboratory (CVL) in Windhoek for salmonella testing. Employees constantly change the knives, and the knives are sterilized. Condemned trimmings are taken to the facility’s dump site for burning.

Guards ensure that trucks that bring animals to the facility have movement permits upon entry and are cleaned and washed prior to departure. There was an area that allowed for adequate antemortem inspection of live animals.

Meatco (Windhoek)

Meatco has four abattoirs. Two are located in the free zone (Windhoek and Okahandja). One is located in the buffer zone (Oshakati). One is located in the infected zone (Katima Mulillo). The buffer zone facility produces meat that is sent to RSA and the local market.

Five percent of the meat produced at the plant is sent to the local market, and the remainder is sent to the EU, RSA, and the Middle East. Meatco adheres to HACCP standards.

Meatco slaughters cattle, sheep, goats, and pigs. Ninety-nine percent of the source farms are on contract procurement. Source farms are premises located south of the VCF. Of ovine that are slaughtered, 90 percent are lamb, and 10 percent are older sheep. Pigs are slaughtered in a separate area with separate equipment.

Carcasses are held in the chillers at 7° C for 48 hours then they are deboned. There is a pH test of random carcasses with a calibrated pH meter. The meter is calibrated before testing each carcass. The pH is done on the forequarter and hindquarter because there can be a 0.2 to 0.4 difference. The average pH is 5.4 to 5.7 on carcasses. (pH testing and maturation are done to meet EU requirements.)

The veterinarian verifies the pH and temperature prior to movement out of the chiller. There is also a visual inspection to see if meat is dark (stress, poor bleeding, and fever). Carcasses are pulled, if necessary, and rejected for export. Meat that is rejected for export is used for the local market.

The same testing is conducted for sheep because of EU requirements. If the pH is not less than 6.0 in 48 hours, the meat will go for local consumption or RSA.

Trucks that do not have an animal movement permit are not allowed to offload. If the permit is valid, the truck is unloaded and entered on the slaughter animal arrival record and antemortem health inspection form. Inspectors examine the animals when the animals are offloaded, and movement permits are collected.

The pens for antemortem inspection were well built with adequate room for moving cattle around for thorough examination. The running chute leading up to holding pens also allowed for adequate

inspection of the animals. After unloading, the trucks are washed at the truck washing station to remove solid matter. Trucks are not disinfected. Washing is verified by the guard who keeps a written record.

Immediately after beheading, corresponding tags are placed on the head and carcass. These tags remain until the carcass has been graded. After this, the tags are removed, and a barcode tag is placed on the carcass. The facility was able to trace one of the barcode tags from a carcass to the incoming shipment of cattle and to the end-product boxes. A pallet tracking system is used to ensure consignments are shipped correctly. Only two people have access to the tracking and loading system to ensure integrity.

Rendered products are used for pet food only. Mechanical separation is used only for canned meats. Every month the facility sends four heads to the laboratory for brain sampling. Delivery to the laboratory is about 5 minutes. The facility submits a total of 50 samples per year. No neurological conditions have been diagnosed at the abattoir by the time of the site visit.

Bush abattoirs

There are bush abattoirs located in villages. As with other abattoirs, some of the bush abattoirs are sources of surveillance information. DVS is in the process of training personnel at these abattoirs; however, some of these abattoirs slaughter only one to two animals per day.

Cold storage

The site visit team visited a commercial cold storage facility. The facility was EU approved. Ninety-five percent of its business is fish, and it focuses on products going from the sea to market. The meat (pork, beef, chicken) the facility handles is mainly for the local market. The facility is temperature monitored 24 hours each day. Security at the facility was very thorough to ensure that unauthorized people cannot access the facility.

Livehaul conveyances

Conveyances are allowed free movement through the VCF gateposts and have no requirement for cleaning or disinfection prior to entry south of the VCF or to the quarantine camps. This does not pose a risk, however, during most seasons of the year. Virus survival is not likely in these vehicles during most seasons due to the steel construction of the truck beds coupled with the extremely hot and dry climate. However, during the rainy season or in the presence of manure, truck beds could easily become a mechanical vector for the FMD virus.

The site visit team expressed its concern that this could be a risk of disease incursion if improperly cleaned conveyances enter the areas south of the VCF from areas that are not FMD free. DVS noted the potential risk posed by cattle trucks and planned to implement a system to disinfect cattle trucks that move south of the VCF. In fact, in November 2004, DVS introduced a system for disinfecting trucks used for the transport of cattle into and out of quarantine camps in the areas north of the VCF. In areas south of the VCF, a system of registration of livestock transports has been introduced. Trucks transporting livestock to export abattoirs must be cleaned and disinfected before the animals are loaded.

Conclusion: Auction, abattoir, and livestock transactions in the areas south of the VCF are closely monitored and appeared to involve supportive participation of animal owners. Due to the structure of the farms and regulations for movement and annual census inspections, markets are unlikely to represent significant threats for the introduction and spread of FMD.

Disease surveillance [1, 5, 8, 9, 36]

The Namibian surveillance system is described in greater detail the document entitled, “Epidemiological Information System for Communal Areas—The Namibian Experience” [36]. In summary, however, FMD surveillance in the surveillance zone consists of farm inspections every 3 months. FMD surveillance in the buffer and free zones is highly dependent on passive surveillance methods due to inaccessibility of diagnostic services in remote locations. In the communal farming areas north of the VCF, inspections are completed twice per year.

Inspections conducted in the free zone are completed on an annual basis. Farms receive a 1-month notice that the inspectors are coming to the premises. During these inspections, DVS gathers animal health information through mandatory visits by veterinarians and AHTs to farms for census and disease reporting. Farmers are required to present at least 80 percent of their livestock for inspection and have movement and marketing restrictions imposed for noncompliance.

In addition, DVS officials often visit premises for reasons not connected with mandatory inspection. In most areas, a lack of private veterinary clinical services results in DVS personnel responding to any disease or sickness reports in livestock. Further surveillance data are available from inspections required for mandatory movement permits and auctions and upon arrival at abattoirs.

The inspection of animals entails walking among the animals but not individual examinations. If an injured or sick animal is observed, the inspector will call the State veterinarian to check the animals. Inspectors also check for the use of growth stimulants. (The use of growth stimulants is prohibited in Namibia.) Inspectors will also take lick and feed samples and check the labels and expiration dates of medications and feed on the premises. DVS can administer livestock movement restrictions. In addition, if a farmer does not allow inspectors to examine the animals, DVS can prohibit the movement of livestock from the farm.

In addition to information gathered at inspections, DVS and the Meat Board of Namibia have an extensive outreach education program for livestock owners. Pamphlets and posters are located in community centers, churches, and gathering places in the southern region of Namibia as well as in the northern communal areas. Radio announcements and weekly programs are widely used to disseminate information and are especially useful in areas that do not have ready access to telephones, the Internet, or television.

In addition, veterinarians and knowledgeable AHTs, assisted by assistant stock inspectors, regularly interact with farmers in all areas. The northern communal area is further targeted with CAHWs and pharmaceutical retailers who have brief (1 to 2 weeks) training from DVS for suspicious signs of foreign animal diseases. These workers have a mandatory responsibility to call for DVS personnel when suspicion of FMD arises.

Personnel meet monthly to discuss interesting sightings or something that was found in the field. DVS conducts continuing education on a regional basis. DVS gathers technicians and inspectors and has outside speakers, pharmaceutical companies, etc., on occasion.

As previously stated, abattoirs are instrumental in the surveillance efforts. Export abattoirs are under the direct supervision of veterinary officials who are paid by the Government of Namibia. In addition to meat inspection and public health issues, the official veterinarian is responsible for certification for export.

Upon arrival at a facility, cattle are inspected for clinical signs of illness by the veterinary staff. In addition, there is an antemortem inspection. During this time, the cattle are examined for FMD signs or lesions. During postmortem examinations, the feet and tongues are inspected for FMD lesions. BSE surveillance is performed through the examination of brains submitted by abattoirs, as previously described under “Abattoirs.” DVS headquarters receives monthly condemnation statements/summaries from export slaughter abattoirs and totals them at the end of the month.

Bluetongue is endemic in Namibia. A few suspect cases are routinely submitted to the CVL for diagnosis. A total of 21 investigations were submitted in the last 5 years to rule out bluetongue in ovine species. Bluetongue serotypes were not identified because virus typing is not routinely performed.

Conclusion: Disease surveillance is heavily oriented toward passive reporting by animal owners coupled with mandatory inspections by AHTs and stock inspectors. Additionally, the lack of private veterinary care encourages the farmers to cooperate and participate in State-run animal disease control programs. The surveillance program appears to be functional and effective due to extensive outreach and community education along with significant punitive action if or when necessary. Observations by the site visit team of animal health records, the intensity of DVS outreach efforts, the response of northern communal farmers, and the enthusiasm of southern farmers suggest that producer commitment to FMD control is very high.

Diagnostic laboratory capabilities [2, 4, 8, 9, 12, 37]

The CVL in Windhoek is a biosecurity level 2 laboratory that is not structured to test for all OIE List A diseases. DVS provided a list of the serological tests that CVL has performed from 2000 to mid-2003 [12].

The laboratory is accredited by the International Organization for Standardization 2000 and has three sections consisting of clinical microbiology, virology, and clinical pathology. CVL also performs residue testing of meat destined for export. Diagnostic submissions for vesicular disease are limited to bovine viral disease, IBR, bluetongue, and orf.

There is a possibility that the laboratory might obtain a diagnostic ELISA kit for FMD for antibody detection from Pirbright Laboratory to be used for screening livestock. However, at the time of the site visit, FMD testing for Namibia was performed at either the Botswana Vaccine Institute or the Onderstepoort Veterinary Institute in RSA.

APHIS visited the Onderstepoort Veterinary Institute. The institute was found to have facilities designated for FMD vaccine production and exotic disease diagnosis. During the site visit, the FMD vaccine facility was found to be adequate. The tests used to investigate FMD in diagnostic specimens are in accordance with OIE guidelines. The laboratory’s records showed that, in the last 3 years, three diagnostic investigations were submitted from Namibia to rule out FMD.

The laboratory produces vaccines containing prevalent FMD serotypes found on the African continent, including SAT 1, SAT 2, and SAT 3. The facility is also equipped to make autogenous FMD vaccines upon request. Namibia’s annual usage of FMD vaccine is about 500,000 doses of bivalent/trivalent vaccines. Staff in the diagnostic laboratory is well trained and motivated.

The site visit team did not visit Botswana Vaccine Institute; however, it is listed as an OIE reference laboratory for FMD.

Namibia has used FMD vaccines produced by either the Onderstepoort Veterinary Institute or the Botswana Vaccine Institute.

Conclusion: The Onderstepoort Veterinary Institute has adequate facilities for FMD vaccine production and diagnosis. The Botswana Vaccine Institute is listed as an OIE reference laboratory for FMD.

Emergency response capability [8, 9, 38, 39]

In the case of a suspicion or confirmation of FMD, Namibia can notify its trading partners within 24 hours. Once FMD is suspected, all animal movements are suspended and exports stopped immediately until further investigation has been completed. DVS maintains communication with State offices by telephone or facsimile.

DVS outlined its response to an FMD emergency in a flowchart [39]. In addition, DVS' emergency response plan for an FMD outbreak is detailed in a document entitled, "*Namibia Foot and Mouth Disease Contingency Plan*" [38]. The plan emphasizes the importance of early detection and reporting and the need for outreach to ensure that farmers as well as DVS staff are familiar with the disease. It outlines protocols for sampling and diagnostic submissions as well as disinfection and biosecurity. Of significance is a reporting list to notify internal agencies and stockholders, the OIE, trading partners, and a public awareness strategy to communicate restrictions and stoppage of all animals and animal products. An emergency equipment list is included for supplies that are kept centrally located at the Otjiwarango office. Instructions for State veterinarians regarding animal movement control and disease containment are addressed as well as the establishment of quarantines, roadblocks, and zones for buffer and surveillance areas.

Contingency plans for funding for immediate mobilization of 300 military personnel in addition to veterinary services staff were reported to the site visit team to have been approved by the Ministry.

The geography of the Southern area of Namibia combines limited roadways with almost uniform subdivision of the area by game and stock fences. Environmental conditions are typically hot and dry, and the political authority allows compulsory vehicle stoppage at roadblocks. These factors coupled with strong public awareness of FMD, mandatory reporting, and routine field inspections by DVS predict the ability to rapidly identify and respond to an outbreak.

Conclusion: Disease control authority, programs, and animal health management appear to be adequate. Emergency response capacity appears to be well planned, documented, and readily implemented. DVS has had recent opportunity to test its emergency response capacity during the FMD outbreak in the Caprivi area, and DVS was able to quickly control the outbreak.

Summary

Strong points

- 1) There have been no outbreaks of FMD south of the VCF since 1965.
- 2) There is substantial public awareness of FMD clinical signs and reporting responsibilities. In addition to public awareness, there appears to be strong support of livestock producers to control foreign animal disease. This, in conjunction with ongoing involvement of DVS staff in

farm visits and sick animal calls, provides a passive surveillance system that appears to be very strong and would likely result in rapid identification and reporting of an FMD outbreak.

- 3) The game-proof fences are well maintained to control the integrity of animal movements from regions potentially infected.
- 4) The movement permitting system with cooperation of police and DVS staff at roadblocks appears to provide very good movement control.
- 5) The national animal identification system and FAN Meat Scheme allow rapid traceback of animals.
- 6) The infrastructure, leadership, and organization of DVS are strengths with a weakness present from the marginally adequate number of trained personnel.
- 7) The public outreach methods for disease education are creative and appear to be very effective (e.g., radio broadcasts, community visits, training of CAHWs and retailers).
- 8) Namibia is in its second year of a 10-year plan to upgrade the buffer and surveillance area. In 10 years, Namibia wants the fence along the Angola border completed and intact with specific areas for animal entry. The goal of the 10-year plan is to improve the veterinary infrastructure and disease control management in the buffer zone and north into Angola. The long-term goal is to move the VCF to the Angolan border with the intention that Namibia as a whole would be an FMD-free zone, except the infected zone of east Caprivi.

Risk Factors and Mitigations [10, 12, 40]

Importation of animal and animal products from other countries

Risk of disease incursion due to the importation of fresh or frozen beef, mutton, or pork; cooked and uncooked processed meat products; milk or dairy products; and hides, skins, and trophies from countries that the United States does not consider FMD free.

(a) In 2000, 2001, and 2002, Namibia imported fresh beef, mutton, and pork from several countries that the United States considers affected with FMD. In addition, Namibia also imported cooked and uncooked processed meat from the RSA. For importation into Namibia, cooked meat has to be cooked to a core temperature of 70° C for 30 minutes. The 30-minute time requirement is not as long as required in 9 CFR, section 94.4, for cooked meat from regions where FMD exists. (Times vary based on whether the meat is cooked in plastic or ground meat cooked in an oven.) Each of these products could be considered a risk factor if meat imported into Namibia is shipped to the United States or commingled with meat products destined for importation into the United States.

(b) Unprocessed hides and skins of ungulates or parts thereof, trophies, wool, and hair must be treated in accordance with veterinary health certificate requirements prior to import into Namibia. Namibia trades with countries that the United States does not consider FMD free, and some of the treatment requirements listed on Namibia's veterinary health certificate for these items are not as restrictive as those required by the United States for the importation of these products from countries/regions affected with FMD.

(c) Namibia has import requirements for milk and milk-based products. The parameters for treatment vary as to whether there have been outbreaks of FMD, without vaccination, within 12 months of production. The parameters for the treatment of these products for areas that have had FMD outbreaks in the previous 12 months, with vaccination, appear to be similar to the current United States requirements listed in 9 CFR, section 94.16. Namibia has separate requirements for these products that are imported from areas where there have been no outbreaks of FMD within the previous 12 months. As previously stated, Namibia has imported milk and milk-based products from countries that the United States considers affected with FMD. Though these products would be allowable into Namibia, the items from those countries would not be allowed into the United States because they have not been treated as required by 9 CFR, section 94.16.

Mitigations: To ensure that there is not commingling of meat and meat products with those destined for export to the United States and to ensure the country of origin of the meat products exported to the United States, the importation of fresh and processed meat from Namibia into the United States must meet the requirements listed in 9 CFR, section 94.11. As to the importation of game meat into the United States from Namibia, game meat would have to meet the requirements listed in 9 CFR, section 94.11(a) and (c). (Paragraph (b) of 94.11 would not apply because game meat does not require certification by the Food Safety and Inspection Service.) Because Namibia is considered affected with ASF, classical swine fever, and swine vesicular disease, fresh (chilled or frozen) pork cannot be imported from Namibia into the United States.

As to hides, skins, wool, and hair, we believe that any of these items that are imported into Namibia from countries that the United States considers affected with FMD could not be exported to the United States because the requirements in 9 CFR, sections 95.5 and 95.7, for unrestricted entry require that these products originate and be shipped directly from countries/regions that the United States recognizes as FMD free or otherwise meet the listed requirements. The requirements in 9 CFR, sections 95.11 and 95.12, for bones, horns, and hoofs for trophies are sufficient to ensure that these items are properly treated prior to entry into the United States. Alternatively, these commodities could be imported into the United States by permit, which would include certification requirements as to the country/region of origin.

As to Namibia importing milk and milk products from countries the United States considers FMD-affected, the requirements listed in 9 CFR, section 94.16(d), are adequate to ensure certification of the country of origin of the production and processing of milk and milk products that are imported into the United States.

Risk Evaluation

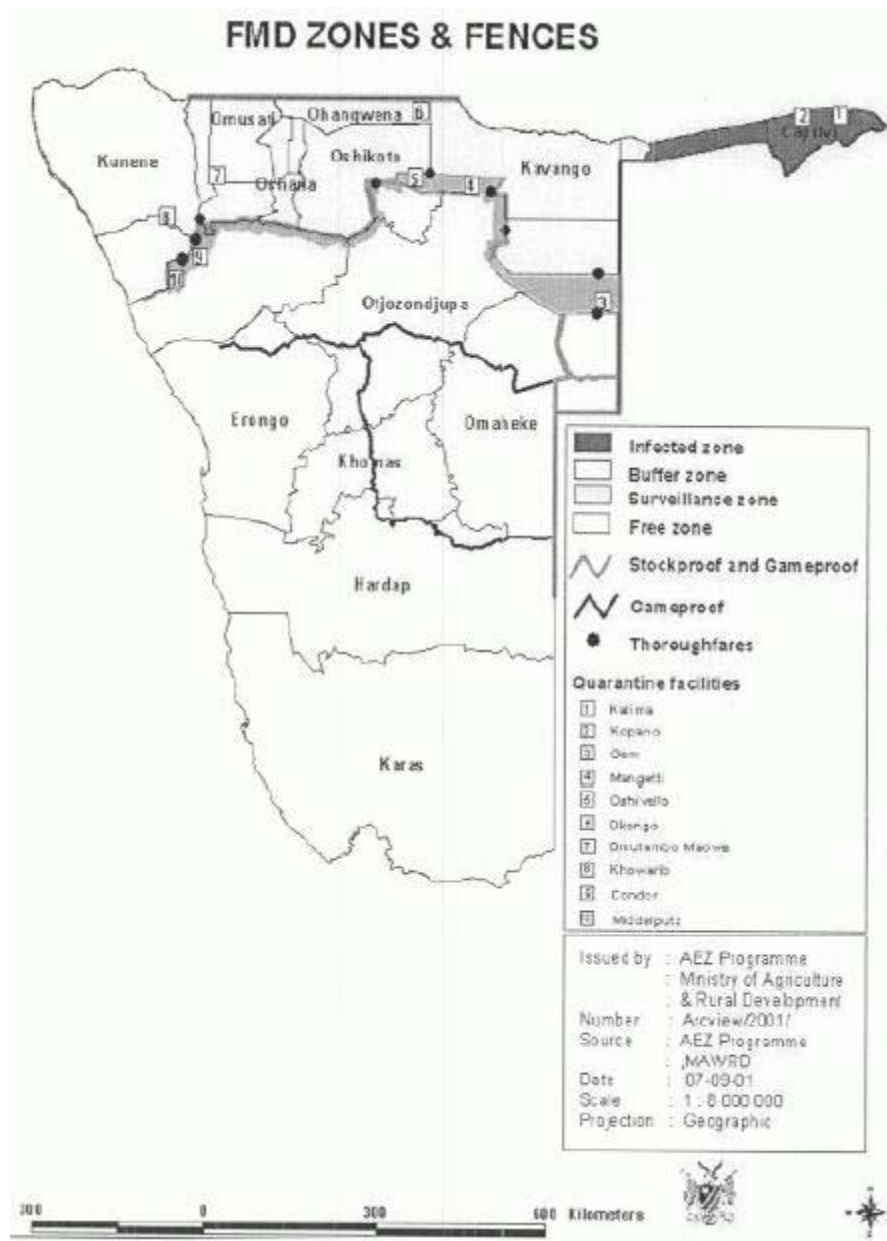
APHIS could identify no additional risk factors currently applicable to Namibia that would justify keeping the region of Namibia south of the veterinary cordon fence from the list of regions APHIS considers as FMD free. However, this evaluation does not relieve import restrictions for live ruminants, germplasm, and swine from Namibia to the United States that result from the fact that Namibia is considered affected with certain OIE listed diseases and other animal diseases that are exotic to the United States.

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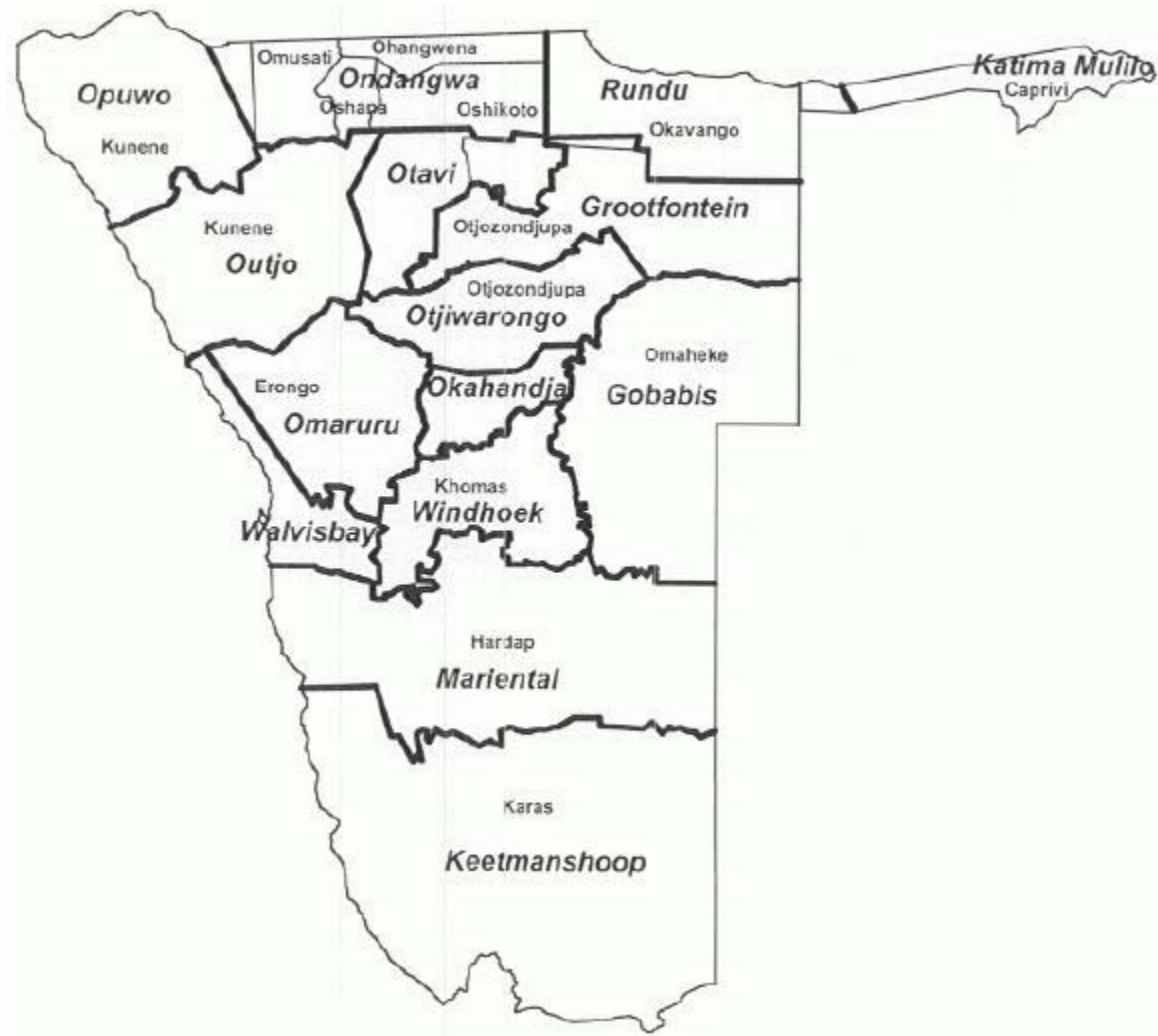
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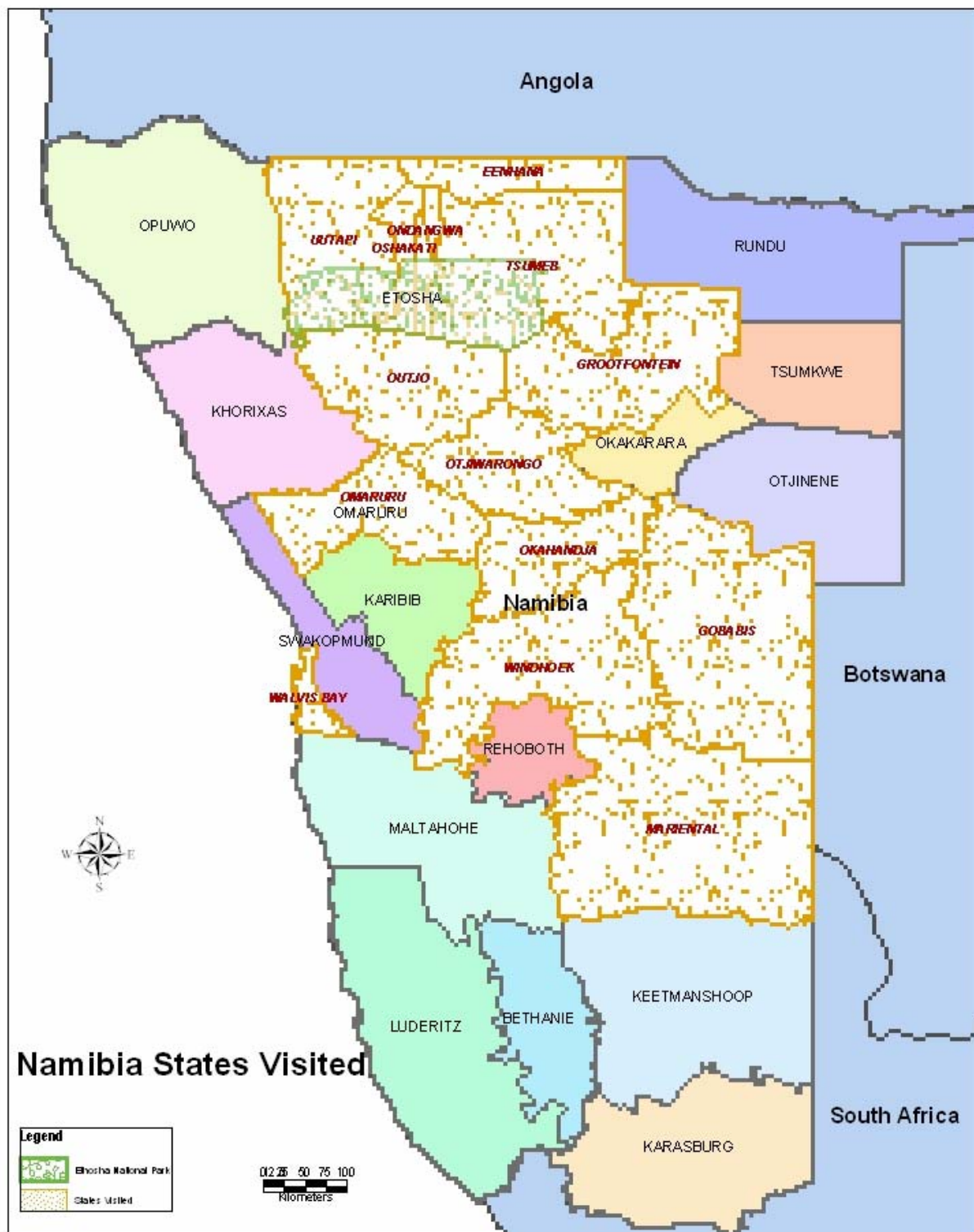
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Appendix 1



Appendix 2 State Veterinary Districts





Appendix 3: Volume of animals imported from Republic of South Africa (RSA) and specific import requirements for various commodities

Import of Cattle, Sheep, Goats, and Pigs from South Africa: 2000 - 2002

Type of Animals	2000	2001	2002
Cattle	1,971	826	993
Sheep	7,015	3,522	6,962
Goats	875	928	601
Pigs	4,371	1,516	1,911

Import of Game from South Africa: 2000 - 2002

Species	2000	2001	2002
Wildebeest	1,890	490	2,767
<i>Antidorcas marsupials</i> (Springbuck)	0	20	501
<i>Kobus ellipsiprymnus</i> (Waterbuck)	0	510	1,226
<i>Damaliscus dorcas philippsi</i> (Blesbok)	0	550	7,705
<i>Aepyceros melapus</i> & <i>A. petersi</i> (Impala)	200	160	4,385
<i>Taurotragus oryx</i> (Eland)	0	0	112

According to the import requirements for cattle, sheep, and goats from the RSA [18], all animals must be branded with a special mark prior to entry into Namibia. Cattle must be tested for tuberculosis and brucellosis within 30 days of arrival in Namibia. Among other things, all of these animals, including swine (based on the import permit for swine), must be of South African origin; originate from the World Organisation for Animal Health (OIE)-recognized foot-and-mouth disease (FMD)-free zone of South Africa and a farm not under veterinary restriction for diseases to which the species is susceptible for at least 30 days prior to export to Namibia; must not be vaccinated against FMD; and cattle must be vaccinated against anthrax in the past 12 months. Cattle, sheep, and goats originating from heartwater areas must be treated for ticks within 72 hours of departure with certification by the veterinary official. For swine [19], there must be a further certification that pigs originate from an African swine fever (ASF)-free area or were kept in double-fenced pig sties since birth or for 3 months prior to export to Namibia.

As to the importation of fresh or frozen meat from the RSA [20], these products must be produced from bovine, ovine, and or caprine species of South African origin; originate from OIE-recognized FMD-free zones of South Africa and farms not under veterinary restriction for FMD control or any other disease to which the species is susceptible; not be derived from animals that have been vaccinated against FMD; and not be derived from animals that have been exposed to animals from nonapproved areas.

Fresh or frozen pork from the RSA must meet similar requirements [21]. The animals from which the meat was derived must originate from the OIE recognized FMD-free zone and from farms not under veterinary restriction for FMD, vesicular stomatitis, African swine fever (ASF), and swine vesicular disease for the previous 6 months. The meat must be derived from animals that were not vaccinated with a classical swine fever (CSF) vaccine within 2 months of slaughter; originate from an area where no case of CSF and Teschen's disease occurred within a radius of 50 kilometers of any of the farms of origin during the previous 6 months. Swine, from which pork is derived, that are not from an ASF-free area must have been kept in double-fenced pig sties since birth or for at least 3 months prior to slaughter. Animals from which fresh or frozen meat are derived must have been slaughtered, processed, and packaged at an approved establishment. (Tables reporting the volume of animal products from the RSA are under "*Importation of meat and meat products.*")

The requirements for the importation of uncooked meat products (including processed meats, matured meats, biltong (dried meat), ham salami, and droe wors (dried sausages)) and frozen meat products (meat pies, burger patties, etc.) from the RSA are similar to those for the importation of fresh or frozen meat [22, 23]. However, for uncooked meat products, pigs must be from approved piggeries that are outside of the ASF-control zone, and the herds of origin must have been serologically tested for porcine reproductive and respiratory syndrome (PRRS) with negative results. For frozen meat products derived from pigs, pigs must be from approved piggeries outside the ASF-control zone or approved double fence facilities if farms are in ASF control zones, and the herd of origin must be tested for PRRS with negative results.

The requirements for the importation of cooked meats [24] are that the meat is derived from animals originating from the OIE-recognized FMD-free zone of the RSA and from farms not under veterinary restriction for FMD control or any disease to which the species is susceptible. For meat originating from pigs, the pigs must originate from areas free from ASF restrictions or alternatively from approved piggeries. In addition, for meat originating from pigs, the herds of origin must have been serologically tested for PRRS with negative results. The products must be processed at an approved processing facility monitored by South African veterinary officials. During processing, the inner core of the product must be at least 70° C for 30 minutes.

There is an import permit for the importation of live cloven-hoofed game animals from the RSA [26]. Importation conditions include the requirement that animals must not originate from Mpumalanga, Kwazulu Natal, or the Northern Province of RSA or any other area that is under veterinary restriction for diseases. The animals must be certified as of South African origin and originate from the OIE-recognized FMD-free zone of RSA and a farm not under any veterinary restriction for diseases to which the species is susceptible for at least 30 days prior to export to Namibia. The animals must also have been born and raised in the province of origin or were resident there for a period of at least 6 months prior to export to Namibia. There are also other requirements as to treatments for external and internal parasites. The animals are inspected on the day of loading and transported in sealed vehicles.

There is a veterinary import permit for the importation of cloven-hoofed game from regions in RSA that are under restriction for animal diseases such as FMD [33]. The animals must originate from an area that is not under veterinary restriction for any disease to which the species is susceptible. The animals must have been maintained on the premises of origin since birth or at least for the 6 months prior to export. During this period, the animals must not have come in contact with any animals of lesser status. The animals must be kept in quarantine for a minimum of 21 days according to stated conditions, and the animals must be individually tested for FMD antibodies as specified by DVS officials in Namibia. In addition, a copy of the serology must be faxed to Directorate of Veterinary Services officials. The animals must also be inspected on the day of loading, found to be healthy, and fit for travel. The trucks must then be sealed after loading.

There is also an import permit for the importation of fresh or frozen game or venison from the RSA [41]. Importation conditions include the requirement that the animals are of game species and of South African origin. In addition, the animals must originate from the OIE-recognized FMD-free zone of the RSA and from farms that are not under veterinary restriction for FMD control or any other disease to which the species is susceptible. Also, the animals must originate from farms where no buffalo were maintained. The carcasses from which the meat was derived must have been subject to postmortem veterinary inspection and found free from signs of disease. The meat must also have been processed and packed at an establishment recommended by the National Director of Veterinary Services for export to Namibia.

For the importation of wildebeest from the RSA [24], the animals must originate from premises with approved camps. The animals cannot originate from provinces identified on the permit. The animals must have been born and raised in the premises and province of origin or were residents there for a period of at least 6 months prior to export to Namibia. The animals must not have come in contact with animals from provinces identified on the permit during this time prior to export. The province of origin must not be under restriction for any disease to which the species are susceptible. These animals are transported in sealed trucks.

Namibia has an import permit requirement for the importation of elephants, rhinoceros, and hippopotamus from the RSA [42]. The animals must be of South African origin and resided in the RSA since birth or for at least 6 months prior to export. They must also originate from premises where there have been no outbreaks of epizootic diseases to which the species is susceptible within a 50 kilometer radius for at least 6 months prior to export. The animals must be permanently identifiable. The animals must also be examined on the day of export by the official veterinarian. The transports are required to be sealed.

Namibia also has a veterinary import permit for camelids (such as llamas, alpacas, vicunas, and guanacos) that are imported from the RSA to Namibia [43]. The animals must have been born in the RSA and resided in the RSA since birth or were legally imported into the RSA and released after complying with the import requirements including quarantine. The premises of origin must not have been under veterinary restrictions for diseases to which the species is susceptible. There is also a list of diseases on the permit that could not have been diagnosed or found present on the premises of origin for the time period provided for each disease. For instance, Johne's disease could not have been diagnosed or found on the premises of origin within 5 years of export. In addition, no case of FMD could have been diagnosed during the past 2 years on any premises on which the animals were maintained during the past 12 months, and no case of FMD could have been diagnosed within a 50 kilometer radius of the premises. The animals must never have been vaccinated for FMD. In addition to being tested for diseases listed in the permit, the animals are transported under seal.

Appendix 4: Requirements for the importation of animals from regions other than the Republic of South Africa

Cattle [27]

The following are several of the requirements that must be certified to on the veterinary health certificate for the importation of cattle.

1. The animals must originate from a foot-and-mouth disease (FMD)-free zone where vaccination is not practiced since birth or for at least the last 3 months;
2. The animals must originate from premises at least 100 kilometers from any place where vesicular stomatitis or FMD has occurred within the preceding 12 months;
3. The animals must not be vaccinated against FMD;
4. The animals must originate from herds that are healthy and free from Johne's disease, rabies, brucellosis, tuberculosis, leptospirosis, campylobacteriosis, trichomoniasis, bovine viral diarrhea, and have no history of enzootic bovine leukosis; and
5. The country of origin is free from bovine spongiform encephalopathy.

There is usually a 30-day period of quarantine for imported animals. Tests and treatments are applied when required.

As of September 1, 1998, Namibia prohibited the feeding of ruminant materials (carcass meal, meat meal or meat, bone meal, or any other bone product including hooves or horns, and blood meal) to ruminants.

Sheep, goats, pigs, and game animals from Botswana [28, 29]

The requirements for importation of live sheep and goats include certification that the animals originate from the World Organisation for Animal Health (OIE)-recognized FMD-free zone and a farm not under veterinary restrictions for other diseases to which the species are susceptible [28]. The animals must have also been kept in the OIE-recognized FMD-free zone in Botswana since birth. Prior to movement, the animals must have been isolated at the establishment for 3 weeks and inspected on the day of loading and found clinically healthy and free from infectious diseases and external parasites. Sheep and goats are tested for brucellosis prior to export to Namibia.

Pigs must be transported in sealed trucks [29] and originate from premises within the OIE-recognized FMD-free zone in Botswana and an area not under restriction for any disease to which the species is susceptible. If the pigs do not originate from an African swine fever-free area, the animals must have been kept in double-fenced pig sties for 3 months prior to export to Namibia. The pigs must also have been kept at the premises of origin since birth or at least for the past 3 months. They must not have come into contact with any animals of lesser health status. Lastly, the pigs must have been under veterinary surveillance for at least 30 days prior to movement to Namibia and found clinically healthy and free of infectious diseases and external parasites.

For game animals, the animals must originate from OIE-recognized FMD-free zones, and the areas must not be under restriction for any disease to which the species are susceptible. The animals must have been kept at the premises of origin since birth or at least for 3 months prior to export. During this time, the animals to be exported must not have been in contact with any animals of lesser health status. In addition, the animals must have been under veterinary surveillance for at least 30 days prior to importation into Namibia and found clinically healthy and free from infectious diseases. These animals are transported in sealed trucks.

Appendix 5: Volume of imported meat and meat products by country of origin

Fresh Meat: 2000

Country of origin	Beef kg	Mutton kg	Pork kg
Argentina	267,000	0	
Australia	89,620	783,084	7,300
Belgium	0	0	18,750
Botswana	3,000	0	0
Brazil	0	0	7,700
Canada	0	0	77,400
France	0	3,000	46,200
Hungary	0	0	4,500
New Zealand	21,250	150,750	0
South Africa	2,100	0	0
Spain	0	0	1,000
UK	0	0	9,810
Uruguay	57,000	0	0
Zimbabwe	331,150	0	332,000

Fresh Meat: 2001

Country of origin	Beef kg	Mutton kg	Pork kg	Processed Meat kg
Australia	44,760	858,031	8,800	0
Canada	0	0	16,000	0
Denmark	0	0	10,000	0
France	0	0	252,660	0
New Zealand	29,610	332,220	0	0
South Africa	824,788	412,210	6,970,796	434,064
Zimbabwe	331,150	0	332,000	0

Fresh Meat: 2002

Country of Origin	Beef kg	Mutton kg	Pork kg	Processed Meat kg
Australia	60,300	179,900	5,000	0
Belgium	0	0	6,000	0
Canada	12,000	0	10,000	0
France	0	0	265,600	0
New Zealand	0	17,000	1,000	0
South Africa	845,540	298,090	1,012,150	104,300
Zimbabwe	87,500	0	504,000	0

(For the import requirements for meat from the Republic of South Africa (RSA), please see Appendix 3.)

- Fresh or frozen pork may be imported if [44] the originating country has been free of FMD, vesicular stomatitis, African swine fever, and swine vesicular disease within the previous 6 months. The meat must be derived from animals that, among other things, are: (1) born, raised, and slaughtered in the exporting country; (2) not vaccinated with classical swine fever (CSF) vaccine within 2 months of slaughter; (3) originating from an area where no case of CSF and Teschen's disease occurred within a radius of 50 kilometers of any of the farms of origin during the previous 6 months; and (4) slaughtered, processed, and packaged at establishments approved by the Directorate of Veterinary

Services (DVS). In addition, animals that do not comply with Namibia's import requirements cannot be slaughtered at these establishments.

Namibia requires an import permit for meat from the RSA that originated from other countries [31]. The meat must be legally imported into South Africa. Though DVS has provisions for direct imports, the amounts imported directly are relatively small volumes. Most importers use agents in South Africa for the importation of meat into Namibia.

From 2000 to 2002, in addition to meat products, Namibia imported milk and milk products from countries such as Australia, Belgium, Denmark, Germany, Ireland, Italy, the Netherlands, Norway, South Africa, Spain, and Zimbabwe [17].

Namibia allows the import of trophies, hides, skins, skulls, wool, and hair by permit [32]. Prior to export to Namibia, an authorized veterinarian of the country of export must certify that the items originate from an area that has been free of FMD for at least 12 months within a radius of 160 kilometers. Prior to importation, hides and skins must have undergone a complete tanning process or processing up to "wet blue." The veterinarian must also certify that the items have been treated as listed on the health certificate if unprocessed. Trophies, wool, and hair must be treated as listed on the certificate. In addition, the items must not be commingled with other products of animal origin that could be infected. The items must be transported directly to their destination in sealed containers and vehicles. The State veterinarian at destination must break the seals of the containers and vehicles and grant authorization to remove the contents.

In 2000 and 2001, Namibia imported hides, skins, and materials such as skull and horn. These imports have come from countries such as Angola, Australia, Botswana, Brazil, Denmark, Egypt, Finland, Germany, Hungary, Mauritius, New Zealand, South Africa, Zambia, and Zimbabwe.

- Hides and skins from Angola are treated and quarantined north of the veterinary cordon fence (VCF) before being transported in sealed trucks to free areas [10]. According to the veterinary permit for hides and skins moved from north to south of the VCF, treated hides and skins that originate from Angola must be moved to an approved tannery (Okapuka or Nakara) only.

Appendix 6: Epidemiologic characteristics of foot-and-mouth disease (FMD)

Etiologic Agent

Family *Picornaviridae*, Genus *Aphthovirus*, types O, A, C, SAT 1, SAT 2, SAT 3, and Asia 1.

Status in the United States

FMD virus (FMDV) was eradicated from the United States in 1929.

Epidemiology

FMD is a highly communicable disease of cloven-hoofed animals caused by an *Aphthovirus* of the family *Picornaviridae*. FMD has seven immunologically distinct serotypes (O, A, C, SAT1, SAT2, SAT3, and Asia 1). The O, A, and C serotypes have historically been found in South America [1]. Research indicates that one serotype does not confer protective immunity against the other six, thus a disease outbreak can be caused by one serotype or a combination of serotypes [2].

FMDV can be transmitted by direct or indirect contact or aerosol. Fomites (such as feed, drinking water, tools, animal products, as well as human clothing, transportation vehicles, rodents, stray dogs, wild animals, and birds) can transmit FMD over long distances. The five main elements that influence the extent of FMD spread are: (1) the quantity of virus released; (2) the means by which the virus enters the environment; (3) the ability of the agent to survive outside the animal body; (4) the quantities of virus required to initiate infection at primary infection sites; and (5) the period of time the virus remains undetected [3, 4].

The incubation period of the FMDV is 2-14 days in cattle, depending on the viral strain and dose and the level of susceptibility of the animal [5]. Morbidity in unvaccinated herds can be high, but mortality usually does not exceed 5 percent. If it occurs during the calving season, calf mortality can be considerable [6]. Young calves may even die before the development of clinical signs usually because the virus attacks the heart muscles [5].

The respiratory tract is the usual route of infection in species other than pigs. Infection can also occur through abrasions of the skin or mucous membranes. In cattle and sheep, the earliest sites of virus infection and possibly replication appear to be in the mucosa and the lymphoid tissues of the pharynx. Following initial replication in the pharynx, the virus then enters the bloodstream. Viremia in cattle lasts for 3 to 5 days; as a result, the virus spreads throughout the body and establishes sites of secondary infections [7].

FMDV localizes in various organs, tissues, body fluids, bone marrow, and lymph nodes [8, 9]. Viral replication may reach peak levels as early as 2 to 3 days after exposure [10, 11]. Virus titers differ in different organs or tissues. Some tissues, such as the tongue epithelium, have particularly high titers. Recent data indicate that the most viral amplification occurs in the stratified, cornified squamous epithelia of the skin and mouth (including the tongue). Although some viral replication also occurs in the epithelia of the pharynx, the amount of virus produced there is apparently much less than the amount produced in the skin and mouth during the acute phase of the disease. By comparison, the amount of virus (if any) produced in other organs like salivary glands, kidneys, liver, and lymph nodes is negligible [10, 11].

Immunity to FMD is primarily mediated by circulating antibodies [12]. The host reaction, including antibody production, occurs from 3 to 4 days after exposure and usually clears the virus, except in carriers. In infected pigs, the virus is cleared in less than 3 to 4 weeks. In contrast, around 50 percent or more of cattle will develop a low-level persistent infection, localized to the pharynx [13-15]. According to Alexandersen (2002) [12], a model for progression of infection can be described as follows: first, virus

exposure and accumulation of virus in the pharyngeal area are followed by initial spread through regional lymph nodes and via the blood stream to epithelial cells. This is followed by several cycles of viral amplification and spread [12].

Clinical signs in cattle during acute infection include fever, profuse salivation, and mucopurulent nasal discharge. The disease is characterized by development of vesicles on the tongue, hard palate, dental pad, lips, muzzle, gum, coronary band, and interdigital spaces. Vesicles may develop on the teats. Affected animals lose condition rapidly, and there is a dramatic loss of milk production [5]. The animal usually recovers by 14 days post infection provided no secondary infections occur [7].

Diagnosis of the disease relies heavily on recognizing clinical signs. In unvaccinated cattle and pigs, the clinical signs are obvious. However, in small ruminants the disease is often subclinical or is easily confused with other conditions. In addition, in endemic regions, clinical signs in partially immune cattle may be less obvious and could pass unnoticed [5]. Virus isolation and serotype identification are necessary for confirmatory diagnosis. The clinical signs of FMD are similar to those seen in other vesicular diseases. Differential diagnosis of vesicular diseases includes vesicular stomatitis, mucosal disease of cattle, bluetongue, rinderpest, and FMD. Serological diagnostic tests include the complement-fixation test, virus neutralization test, and an enzyme-linked immunosorbent assay test. Other diagnostic tests include one- or two-dimensional electrophoresis of the viral DNA, isoelectric focusing of the viral structural proteins, or nucleotide sequencing of the viral RNA [4].

FMDV is a relatively resilient virus. It can survive up to 15 weeks in feed, 4 weeks on cattle hair, and up to 103 days in wastewater. The survival of the virus in animal tissues is closely associated with the acidity of that tissue. For example, in muscular tissues the acidity of rigor mortis, which occurs naturally, inactivates the virus. The production of lactic acid in these tissues during maturation is considered to be the primary factor for inactivation [16]. An acid environment where the pH is less than 6.0 will destroy the virus quickly [16, 17]. Several studies showed that in tissues where no acidification occurs (e.g., lymph nodes, bone marrow, fat, and blood), the virus may survive for extended times in cured, uncured, and frozen meat [9, 16-19]. Heating at 50° C [20] and up to 155° F [21] will inactivate the virus.

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